SFG1361 REV

World Bank Loaned Hebei Clean Heating Project

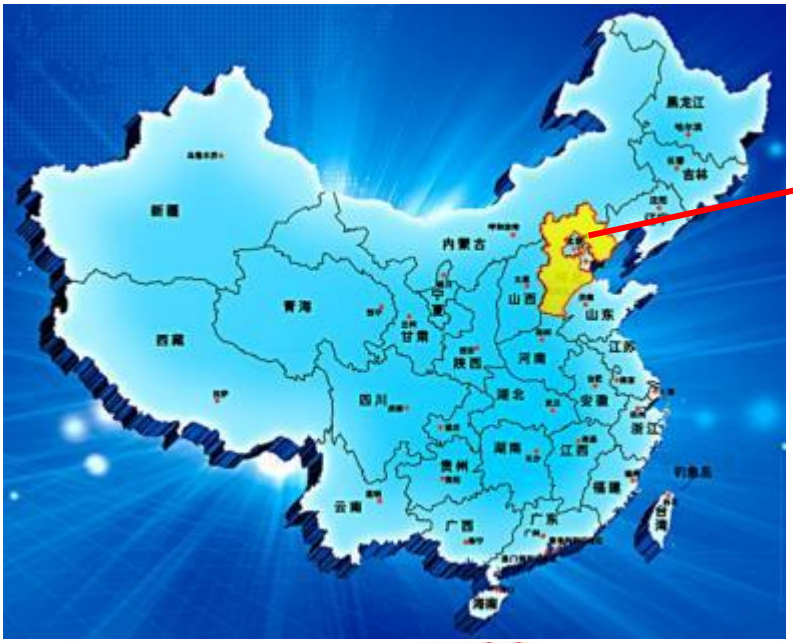
Environmental Impact Assessment Report

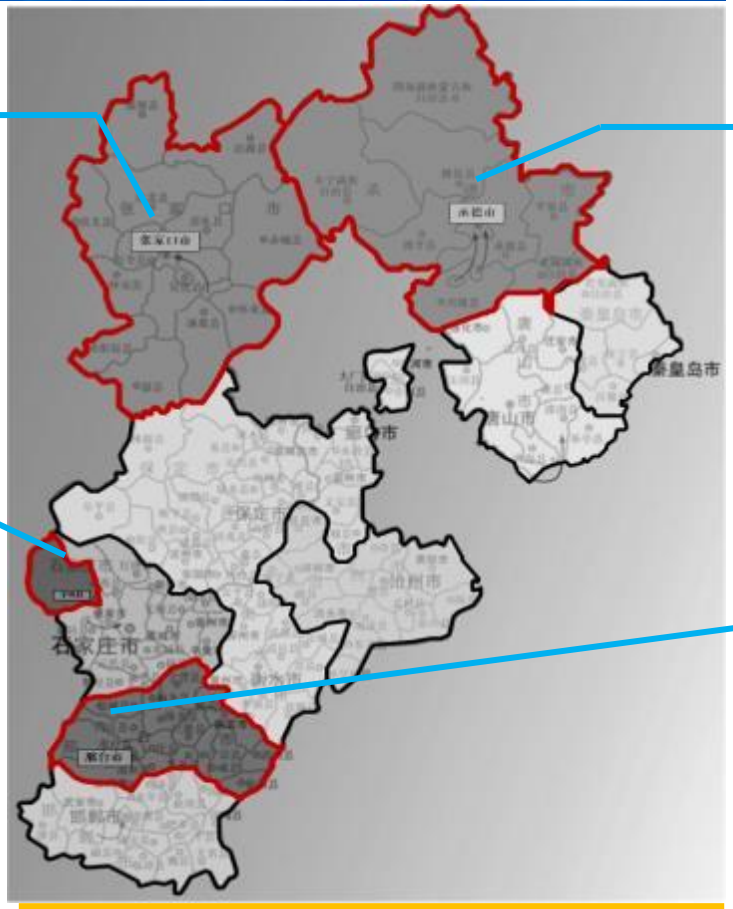
Foreign Debt Management Center of Hebei Provincial Government

September 2015

Contents

Appendices





WB-financed Hebei Clean Heating Project Subproject Locations

Introduction

World Bank (hereinafter referred to as WB) Financed Hebei Clean Heating Demonstration Project (hereinafter referred to as "the Project") has been included in the national list of candidate projects for WB financing. According to the WB environmental policy, this Project is classified as Category A requiring preparation of full EIA report, an Environmental Management Plan and EIA Executive Summary.

1. Overview

1.1 Project Background

Located in North China Plain, Hebei Province is one of the three provinces/municipalities (Beijing, Tianjin, Hebei) for regional collaborative development. Development of district heating in Hebei Province began since 1970s. Since early 1990s, Hebei Province has been accelerating development of district heating to drive economic growth, promote urbanization and continuously expand the coverage of district heating. A heating model dominated by CHP-based district heating and supplemented by heating using large regional boilers and other clean energies (e.g. fuel gas, ground source heat pump and geotherm) has been developed. By the end of 2014, the Province's district heating area reached 702,000,000 square meters accounting for 52.6% of the total urban built area, an increase of 4.4% over the previous year, and 620,000,000 square meters without district heating. The areas without district heating are mainly located in the county towns. 70% of the district heating area are residential buildings and the remaining 30% are business and public buildings.

Development objectives of heating sector in Hebei Province include: (i) development of district heating depending on CHP and being supplemented by large regional boilers, to improve urban environment and living comfort of the residents; (ii) Heating is in compliance with national standards in terms of heating temperature and timely pipeline repair, compliance rates of which should reach 95% and 100%, respectively; (iii) Urban district heating coverage is over 80% and charging based on heat consumption is more than 30% in terms of heating area; and (iv) reform of heating metering is widely promoted. The focuses of development will be: 1) development of urban heating system dominated by CHP and district heating and gradual closure of small and decentralized coal-fired boilers with a unit capacity of below 10 t/hour for the cities and below 4 t/hour for county-level cities; 2) active utilization of solar energy, wind, geotherm and biogas among other clean energies to build a new energy system; 3) effortful implementation of energy-efficient technology reform to heating systems for the purpose of increasing energy utilization efficiency; 4) implementation of energy-efficient reform to existing buildings aiming to finish heat metering and energy-efficient technology reform to more than 50 million m^2 of existing buildings by 2015 and more than 100 million m^2 of existing buildings by 2020; 5) full implementation of heat metering reform aiming to put an end to area-based billing and start to implement consumption-based billing for all newly built buildings, large public buildings and those buildings after heat metering reform. All county-level cities and county towns with a population of 100,000 or more will develop and publish heating metering price and billing methods and start to implement pilot projects of heat metering and billing with a total area of no less than 500,000 m^2.

In such a context, Hebei Provincial Development and Reform Committee (HBDRC) submitted an application to the national government for utilizing WB loan to implement this Project. The Project plans to implement clean heating demonstration in 4 cities and counties in Hebei Province aiming to carry out energy-efficient reform to the existing heating facilities through introducing leading heating concepts and technologies from home and abroad and construct a clean heating system through construction of some new heating facilities, implementation of industrial waste heat utilization activities and closure and elimination of outdated heating sources (i.e. small heating boilers). The Project will also install heat meters for end users in some

areas of the project cities / counties and implement capacity building for the clean heating system.

Objectives of this Project are: (i) to improve heating capacity of the project cites/counties, increase district heating coverage; (ii) to improve utilization rate of industrial waste heat and other renewable energy, and eliminate heat sources of small coal-fired boilers to reduce air pollutant emission; (iii) to improve automation of heating network and exchange stations and energy efficiency; (iv) to replace aging pipeline to reduce heat loss, save energy, and improve heating system safety; (v) to introduce energy-efficient and cost-effective building heat exchange station; (vi) to install heat metering devices for end users to save energy; (vii) to improve heating stability and temperature control by improving operation efficiency and management ability of the heating companies in project cities/counties; and (viii) to achieve targets and requirements specified in local urban heating sector plan.

The impacts that the Project will produce on regional atmospheric environment and urban infrastructure construction sector include: A) improving living quality of urban residents; B) increasing energy efficiency of heating services and optimizing heating methods in project cities and counties; C) promoting environmental performance and reliability; D) providing contribution to realization of the pollutant emission reduction objectives set in the "Detailed Rules of Implementation of the Air Pollution Prevention Plan of Beijing, Tianjin and Hebei and Their Surrounding Areas"; D) making contributions to realization of the national objectives set in the "Air Pollution Prevention and Control Plan".

This Project consists of four sub-projects located in four cities and counties, i.e., Chengde Sub-project, Pingshan Sub-project (Pingshan County is under the jurisdiction of Shijiazhuang City), Xingtai Sub-project, and Zhangjiakou Sub-project. Major feature of this Project is construction of clean heating facilities, including construction of heat pipelines, new construction and upgrading of exchange stations, and construction and improvement of heating networks. In addition, project management and clean heating capacity building is also included in this Project. All the four sub-projects contain the above construction contents.

Executing agency (EA) of this Project is Hebei Provincial World Bank Loan Project Management Office (i.e., Foreign Debt Management Center). A project leading group has been set up in each project city/county, and a PMO is also set up under each project leading group to undertake routine project management. Meanwhile, a local heating company is designated in each project city/county as implementing agency (IA) of each sub-project.

The PMOs and IAs of the four subprojects, namely, Chengde Heating Co., Ltd., Pingshan County Urban Heating Co., Ltd., Xingtai RISUN Anneng Heating Co., Ltd. and Zhangjiakou Dongyuan Heating Co., Ltd. will carry out the project activities in the preparatory and implementation stages of the Project under the guidance of Hebei Foreign Debt Management Center.

Table 1–1 Project Features

	Chengde Sub-project	**Pingshan Sub-project**	**Xingtai Sub-project**	**Zhangjiakou Sub-project**
Sub-project IA	Chengde Heating Co., Ltd.	Pingshan County Urban Heating Co., Ltd.	Xingtai RISUN Anneng Heating Co., Ltd.	Zhangjiakou Dongyuan Heating Co., Ltd.
Focal Point of Each IA	Ji Wei	Zhang Jianming	Yin Yongwei	Wang Zhigang
Main Project contents	1. Construction of new conventional heat exchange station, building heat exchange station, and part of primary heating network 2. Energy-saving upgrade of old	1. Construction of primary heat pipe network, regular exchange station, building heat exchange station 2. Expansion and renovation of heat exchange station 3. Renovation of part of the primary heat pipe network 4. Installation of household	1. Renovation of equipment at the heat source plant area; construction of new circulating water pipes and steam pipes to the primary station 2. Construction of the heat exchange primary station facilities 3. Construction of part of the primary heat pipe network	1. Construction of new pressure-separated heat exchange stations, primary heat pipe network and hot water pipe network 2. Construction and renovation of building heat exchange station 3. Construction of new

	Chengde Sub-project	Pingshan Sub-project	Xingtai Sub-project	Zhangjiakou Sub-project
	primary and secondary heating pipe network and facilities	heat meter; renovation of the network automation monitoring system; construction of new automatic monitoring command center	4. Construction of part of the regular exchange station and building heat exchange station	heat dispatching center 4. Installation of household heat meter 5. Converting coal-fired boiler to gas-fired boiler
Total Capital Cost	CNY 212.34 million	CNY 154.36 million	CNY 668.54 million	CNY 454.09 million
Proposed WB Loan	US$ 20 million	US$ 12 million	US$ 33.5 million	US$ 33.5 million
Construction Period	3 years	4 years	5 years	3 years

1.2 Objectives and Contents of Environmental Impact Assessment

Environmental impact assessment aims to provide scientific and objective assessment of potential environmental impacts associated with construction and operation of the proposed facilities, evaluate extent of the impacts and occurrence possibility of risks, develop feasible and practical measures and management plan to mitigate the adverse environmental impacts and risks, and further provide basis for decision-making in addressing environmental al issues during project implementation.

Based on project features and condition of the proposed project area, environmental impact assessment includes:

1) Project background; level, scope and standard of assessment; introduction of environmental protection objectives, analysis of compliance with policies and plans, etc.

2) Introduction of project background, contents and construction methods and other aspects of the Project；

3) assessment of existing environmental condition; forecast and assessment of potential environmental impacts; analysis of environmental risks；

4) identification of sensitive receptors, proposed mitigation measures; preparation of EMP and other relevant work plans of environmental protection;

5) analysis of alternatives；

6) due diligence of associated facilities and analysis of cumulative impact

7) public consultation, and suggestions

1.3 Scope of Study and Assessment

Based on project features, associated facilities, as well as requirements for environmental impact assessment, scope of the EIA is from the heat source to the pipeline end (including household connectio) and the associated project components, specifically including:

1) Scope of construction components: the construction components of the Project and the associated facilitiess (heat source, small boiler demolition and natural gas pipelines);

2) Scope of works: natural gas transmission pipeline (Zhangjiakou Subproject), heat source, primary network (including trunk thermal pipeline) and primary heating station (Xingtai Subproject), pressure isolation heat exchange station and boiler coal-to-gas conversion (Zhangjiakou Subproject), secondary network and building-level heat exchange station and household connection, etc.;

3) Scope of environmental elements: ambient air, sound environment, water environment

(including surface and groundwater environment), ecological environment (including various natural reserves), social environment (including cultural relics);

4) Scope of implementation: design preparation stage, construction stage and operation stage.

The aforesaid components constitute the spatial and temporal scopes of EIA of the Project. The scope of environmental impact assessment determined based on the environmental elements is shown in **Table 1-2.**

Table 1–2 Scope of Environmental Impact Assessment

No.	EIA Factors	Scope of Assessment
1	Acoustic	Impact of construction noise on environment sensitive receptors during construction; impacts of equipment noise during the operation period of the heat exchange stations over specific sensitive sites.
2	Atmospheric	Impact of dust suspension caused by structure demolition and construction of heat exchange station and pipelines.
3	Surface Water	Insignificant Impact of discharge of small quantity wastewater to surface water during construction. Source water quality of Xingtai heat source.
4	Groundwater	Based on preliminary investigation result, no detailed assessment of groundwater is needed.
5	Solid Waste	Construction waste, demolition waste, and domestic waste during construction stage
6	Ecology and Water Conservation	Impacts associated with construction of heat exchange station and pipe network.
7	Social	Land acquisition and resettlement impacts; impacts of construction of new exchange station and pipe network to nearby sensitive receptors, such as hospitals, schools; and other social impacts during construction (impact to daily life of residents along the pipeline, such as traffic and commercial impact).
8	Other (associated facilities)	Under scope of due diligence

The specific scopes of EIA identified for the various subprojects are shown in **Table 1-3**.

Table 1–3 Specific scope of EIA of the subprojects

SN	EIA elements	Stage	Contents and scope of EIA			
			Chengde Subproject	**Pingshan Subproject**	**Xingtai Subproject**	**Zhangjiakou Subproject**
1	Sound environment	Construction stage	100m on both sides of the pipelines	100m from heat exchange station and pipeline construction sites	100m outside the boundary of primary heat exchange station and 100m on both sides of the center line of the pipelines	A)100m outside the boundary of coal-to-gas constructio site B)100m around the boundary of pressure isolation heat exchange stations C)100m on both sides of fuel gas and heating pipelines
		Operation stage	100m around the boundary of heat exchange stations	100m around the boundary of heat exchange stations	100m around the boundary of heat exchange stations	100m around the boundary of heat exchange stations
2	Air environment	Construction stage	100m from heat exchange station and pipeline construction sites	100m from heat exchange station and pipeline construction sites	100m from the construction sites of primary heat station and 100m along pipelines under construction	A)100m outside the boundary of coal-to-gas construction site B)100m around the boundary of pressure isolation heat exchange stations C)100m on both sides

SN	EIA elements	Stage	Contents and scope of EIA			
			Chengde Subproject	Pingshan Subproject	Xingtai Subproject	Zhangjiakou Subproject
						of fuel gas and heating pipelines
		Operation stage	None	None	None	Fume emission of gas boilers (emission outlet)
3	Water environment	Construction stage	None	None	None	None
		Operation stage	None	None	None	None
4	Ecological environment	Construction stage	100m around heat exchange stations along both sides of pipelines	100m around heat exchange stations along both sides of pipelines	A) 100m around primary heat station and heat exchange station B)100m on both sides of the pipelines	A)100m around pressure isolation heat exchange stations and heat exchange stations B)100m on both sides of the pipelines; C)100m on both sides of the gas pipelines
		Operation stage	None	None	None	None
5	Social environment	Construction stage	Sensitive sites around the new (renovated) heat exchange stations and along temporary land occupation sites for pipeline construction	Sensitive sites around the new heat exchange stations and along temporary land occupation sites for pipeline construction	Sensitive sites around the primary heat stations and new heat exchange stations and along temporary land occupation sites for pipeline construction	A)Sensitive sites around the pressure isolation heat exchange stations and new (renovated) heat exchange stations and along temporary land occupation sites for pipeline construction C) Sensitive sites along gas pipelines
		Operation stage	None	None	None	None
6	Environmental elements of associated projects		Heat source	Heat source	Heat source	A) heat source B) NG transmission pipelines for gas-fired boilers

Note: The associated projects are mainly concerned with the emission of pollutants involving nationally specified control indicators.

1.4 Environmental Impact Identification and Assessment Factors Screening

1.4.1 Environmental Impact Identification

Based on project features and environmental characteristics of the project area and in accordance with technical guidelines for environmental impact assessment and the WB safeguard policies, environmental impacts are identified including:

1) Major environmental impact factors during construction include dust suspension, open excavation, material transportation and storage, pipeline welding fume, vehicle noise and dust, vehicle exhaust, and waste soil. The Project will produce significant adverse impacts on ambient air, sound environment, road traffic and local residents during construction. At the end of the construction stage, these adverse impacts will disappear or be reduced to minimal (e.g. noise). The impacts on water environment during construction are extremely minor and

substantially no impacts will be produced on ground water environment since relatively a small number of construction workers will be located on the same site in the same period and hardly any construction camps will be established on the construction sites during the construction of pipelines and heat exchange stations under the Project.

2) Main environmental impact factors during operation include noise of heat exchange station and smoke from gas-fired boilers. In addition, boiler explosion and hot water leakage from the heating pipelines will be the environmental risks possibly to arise in the operation stage.

3) Positive environmental impacts will be produced by utilization of CHP for district heating, replacement of small decentralized coal-fired boilers and coal-to-gas conversion of existing boilers.

Results of environmental impact identification show that the adverse impacts to be produced by the Project on environment will mainly concentrate in the construction stage. Details of environmental impact identification are shown in **Table 1-4**.

Table1–4 Identification of environmental impact factors in different stages of the Project

Impact factor		Construction stage					Operation stage				
		Construction	**Site clearance**	**Material transportation and storage**	**Solid waste**	**Waste gas**	**Waste gas**	**Noise**	**Risk of hot water leakage**	**Risk of boiler explosion**	**DH**
Natural environment	Air	-★	-★	-○	-○	-☆	-☆			-☆	+★
	Surface water										
	Ground water										
	Sound environment	-★	-☆	-☆				-○			
Ecological environment	Vegetation	-○	-○		-○						
	Soil	-○	-○								
	Land use	-○	-○	-○	-○						
Social environment	Economic development	+☆		+○						-○	+★
	Increase of job opportunity	+○	+○	+○							+☆
	Occupational health	-○	-○			-○	-○	-○	-☆	-○	+★
	Transportation	-☆	-☆	-★	-○						
	Life Quality	-☆	-○	-○		-○	-○	-○	-○		+★
	Environmental landscape	-☆	-☆	-○	-○						+★

Note:

1. "+" indicates positive effect; "-" indicates negative effect; "★" indicates significant impacts; "☆" indicates average impacts; "○" indicates minor impacts.

2. The waste gas impacts in the operation stage mainly come from smoke emission of gas-fired boilers of Zhangjiakou Subproject.

1.4.2 Screening of Environmental Impact Assessment Factors

According to natural and social environment characteristics of the project area, as well as the national and local standards for environmental protection and pollution control indicators and related WB environmental requirements, the environmental impact factors are screened through analysis of pollution sources of the proposed project. As a result of the different geographical regions and construction sites, the assessment factors screened for the various subprojects are

also different. The key EIA factors as screened are shown in **Table 1-5**.

Table 1–5 Results of Screening of Key EIA Factors

Environmental Element	Stage	Construction Activity and Impact Sources	Key EIA Factors			
			Chengde Subproject	Pingshan Subproject	Xingtai Subproject	Zhangjiakou Subproject
Air environment	Status assessment	Climate and current urban activities	TSP	TSP	TSP	TSP
	Analysis of impacts in the construction stage	Dust	TSP	TSP	TSP	TSP
	Prediction of impacts in operation stage	Climate	/	/	/	Emission by gas-fired boilers in Zhangjiakou Subproject:SO2, NOx
Surface water environment	Current impact analysis	drainage	Water quality	Water quality	Water quality	Water quality
	Analysis of impacts in the construction stage	Wastewater from pipeline pressure test and equipment washing and domestic activities in the construction sites to be discharged into the municipal sewage pipelines will be small in volume, producing substantially no impacts on surface water environment.	/	/	/	/
	Prediction of impacts in operation stage	Wastewater discharged from softened water production system into the municipal sewage pipeline will be small in volume, producing substantially no impacts on the surface water environment.	/	/	/	/
Ground water environment	Analysis of impacts of the current stage, the construction stage and the operation stage	Wastewater to be discharged into the municipal sewage pipelines and solid waste for transportation and disposal will be small in volume, producing substantially no impacts on ground water environment.	/	/	/	/
Ambient noise	Status evaluation and analysis of impacts of the construction stage	Noises brought by construction activities, machinery operation, traffic, etc. will generate impacts on environmentally-sensitive sites, operation positions and plant boundary	Leq A	Leq A	Leq A	Leq A
	Analysis of impacts in the operation stage	Operation of equipment in pressure isolation heat exchange station				
Solid waste	Analysis of impacts of solid	Construction waste (including backfill waste soil),	Rationality of solid waste	Rationality of solid waste	Rationality of solid waste	Rationality of solid waste

Environmental Element	Stage	Construction Activity and Impact Sources	Key EIA Factors			
			Chengde Subproject	Pingshan Subproject	Xingtai Subproject	Zhangjiakou Subproject
	waste disposal in the construction stage	waste material and a small volume of domestic wastes	disposal	disposal	disposal	disposal
	Analysis of impacts of solid waste disposal in the operation stage	A small volume of waste materials and domestic solid wastes				
Ecological environment	Impact analysis		Land use, vegetation	Land use, vegetation	Land use, vegetation	Land use, vegetation
Environmental risks	Construction stage	Fire, mechanical injuries, welding gas explosion	Life and property safety	Life and property safety	Heat source safety	Life and property safety
	Operation stage	Heating pipeline leakage, boiler explosion				
Social impacts	Construction stage	Traffic congestion, streetside business, school, resident living quality, land occupation and resettlement	Traffic convenience, poverty reduction, livelihood and employment, gender	Traffic convenience, poverty reduction, livelihood and employment, gender	Traffic convenience, poverty reduction, livelihood and employment, gender	Traffic convenience, poverty reduction, livelihood and employment, gender
	Operation stage	Affordability, gender issues				
Associated projects						
Air environment	Status assessment	Pollutant discharge of associated projects	Emission monitoring indicators specified for heat source companies (SO2, NOx, fume, etc.)	Emission monitoring indicators specified for heat source companies (SO2, NOx, fume, etc.)	Emission monitoring indicators specified for heat source companies (phenol, benzene, Non Methane Total Hydrocarbon, hydrogen sulfide, SO2, NOx, etc.)	Emission monitoring indicators specified for heat source companies (SO2, NOx, fume, etc.)
	Analysis of impacts in construction stage and operation stage	Pollutant discharge of associated projects (heat source, small boiler demolition)	Specified emission monitoring indicators (SO2, NOx, dust)	Specified emission monitoring indicators (SO2, NOx, dust)	Specified emission monitoring indicators (phenol, benzene, Non Methane Total Hydrocarbon, hydrogen sulfide, SO2, NOx, dust, etc.)	Specified emission monitoring indicators (SO2, NOx, dust)

Note: 1. Total suspended particles (TSP), sulfur dioxide (SO2) and nitrogen oxides (NOx).

1.5 EIA Category and Level

According to requirements of environmental screening and classification in the Environmental

Assessment of the World Bank Safeguard Policy (OP4.01), this project is classified as Environmental Category A and full environmental impact assessment is required.

The Project involves energy-efficiency renovation and expansion of district heating facilities in the urban area. Analysis of the construction works, locations, sensitivity, scale as well as the characteristics and magnitude of potential environmental impacts of the Project shows that some adverse environmental impacts, e.g. impacts on air environment, sound environment, etc., will be generated from construction of the Project, but such impacts will be relatively minor thanks to the corresponding environmental protection actions to be implemented and no irreversible environmental impacts will be produced. According to relevant national technical guidelines in environmental impact assessment for the atmospheric environment, and sound environment, etc., environmental element assessment levels have been comprehensively analyzed and determined, see **Table 1-6.**

Table 1–6 Environmental Element Assessment Levels

Environmental Element	Basis of Assessment Levels	Assessment Level			
		Chengde Sub-project	Pingshan Sub-project	Xingtai Sub-project	Zhangjiakou Sub-project
Ambient Air	Suspended dust is non-systemic emission and is in relatively large quantity, but the impact is temporary and only occurs in construction period. Existing coal-fired boiler will be replaced by gas-fired boiler, which will improve regional air environment.	Impact analysis	Impact analysis	Impact analysis	Level 3
Surface Water	The project has no effect on surface water in project area.	Impact analysis	Impact analysis	Impact analysis	Impact analysis
Groundwater	The project has no effect on groundwater in project area.	Impact analysis	Impact analysis	Impact analysis	Impact analysis
Noise	Various machinery and construction noise during construction impacts a large scope, but the impact is temporary. Heat exchange station will generate noise, but the impact to surrounding sensitive receptors is insignificant after shock absorption and sound insulation measures are taken.	Level 2	Level 3	Level 3	Level 3
Ecology	Habitat of animals and plants will not be damaged during construction.	Level3	Impact analysis	Impact analysis	Level 3
Risk Assessment	There are no major risk sources for the Project	Impact analysis	Impact analysis	Impact analysis	Impact analysis

1.6 EIA Methodology

Basic approach of EIA is, based on investigation, analysis, and forecast assessment, to determine extent and scope of the potential impacts and assess feasibility of the proposed project in order to provide a scientific basis for decision-making by the environmental authority, design optimization by the design institute, and environmental management by the IA.

The methods to be adopted in the EIA include:

1) to carry out a survey of the environmental conditions on site based on the scope of construction and properties of all construction sites to understand the background of environmental elements, such as air environment and sound environment, as well as the status quo of environmental quality of the project area;

2) to identify and determine the positions, volume and law of pollutant discharge by means of engineering analysis, analog investigation and numerical calculation;

3) to analyze the types and ways of emission of waste gas, solid wastes and noises and predict positive and negative impacts to be produced by project construction and operation on the regional environment as well as their level and scope;

4) to analyze the feasibility and rationality of pollution prevention (and mitigation) measures, recommend solutions and proposals of pollutant control and reach a definite conclusion in project feasibility from the perspective of environmental protection.

1.7 Major Points of EIA

Major points of environmental impact assessment include:

1) Environmental impact analysis (including environmental impact analysis of sensitive receptors) and development of mitigation measures;

2) Social impact analysis;

3) Public consultation and information disclose;

4) Due diligence of heat source enterprises and closure of small coal-fired boilers;

5) Environmental management plan;

6) Analysis of alternatives;

7) Cumulative impact analysis;

8) Environmental risk analysis.

1.8 Environmental Protection Targets

Environmental protection targets of this project are all the targets which are important and require protection during project construction and operation. Results of sensitive target identification carried out in the preparatory stage of the Project show that the area where the Project is implemented involves no natural reserves, important cultural relics, famous scenic sites, basic farmland, water source protection zones or other special sensitive targets. Quantities and classification of key environmental protection targets identified for the Project are shown in Table **1-7-1**. Details of the key environmental protection targets identified for the various subprojects are shown in Tables numbered from **1-7-2** to **1-7-5**.

Table1–7–1 Key Environmental Protection Targets of the Subprojects

	Chengde Subproject	**Pingshan Subproject**	**Xingtai Subproject**	**Zhangjiakou Subproject**
Key environmental protection targets	In the neighborhood of the construction sites of the Project, there are 10 residential areas, 2 schools, 1 hospital and 1 road, including 4 special sensitive targets and 10 ordinary sensitive sites.	In the neighborhood of the construction sites of the Project, there are 20 residential areas, 1 school, 2 hospitals and 14 administrative offices and business and research institutions, 8 ordinary road intersections, 7 affected municipal pipelines, 1 railway crossing and 3 provincial highway crossings and excavation sites, including 4 special sensitive targets and 52 ordinary sensitive	In the neighborhood of the construction sites of the Project, there are 92residential areas, 8 schools, 10 hospitals and 14 roads, 9 important road intersections, 1 railway crossing and 1 provincial highway excavation site, including 31special sensitive targets and 104 ordinary	In the neighborhood of the construction sites of the Project, there are 30 residential areas, 3 schools, 8 public institutions and 4 important road intersections, including 22special sensitive targets and 23 ordinary sensitive sites.

	Chengde Subproject	Pingshan Subproject	Xingtai Subproject	Zhangjiakou Subproject
		sites.	sensitive sites.	

Table 1-7-2 Key Environmental Protection Targets of Chengde Subproject

Environmental Elements	Scope of Works	Environmental Protection targets	Direction	Minimal Distance (m)	Environmental Quality Standard (level)
A) Ordinary environmentally sensitive targets					
Air environment, sound environment	Construction of new pipelines	Shuixiehuadu Residential Community	SE	60	Class II standard of the Sound Environment Quality Standard (GB3096-2008) Class II standard of the Ambient Air Environment Quality Standard (GB3095-2012)
		NanyuanXiaonangou Residential Community	SW	25	
		LijingHuating Residential Community	W	50	
		Water Supply Company Residential Community	SW	30	
	Reconstruction of old pipelines	Niujuanzigou Residential Community	N	36	
		Nanyuan Residential Community	E	30	
	Heat exchange station	Shuixiehuadu Residential Community	SE	11	
		Jinniushanzhuang Residential Community	W	12	
		Modern City Residential Community	N	10	
		DeshengMeidiwanjing Residential Community	SE	10	
		NanyuanXiaonangou Residential Community	SW	6	
		LijingHuating Residential Community	W	10	
		Water Supply Company Residential Community	SW	12	
		Baishunyuan Residential Community	NE	10	
Air environment, sound environment	Demolition of small boiler houses	Minzu Middle School	SW	28	Class II standard of GB3095-2012 Class II standard of GB3096-2008
		Water Supply Company Residential Community	SW	12	
Ecological environment	Land occupation area	Vegetation, artificial landscape	/	/	Vegetation is protected; landscape remains harmonious.
B) Special environmentally sensitive targets					
Air environment, sound environment	New construction of pipelines	Minzu Middle School	SW	30	Class II standard of GB3095-2012 Class II standard of GB3096-2008
	New construction of heat exchange stations	Hospital No. 266	SE	20	
		Puning Primary School	E	20	
		Minzu Middle School	SW	22	
Social environment	Construction activities	Tourism	/	/	No impacts on tourism in Chengde
		Traffic	/	/	Adverse impacts on normal

Environmental Elements	Scope of Works	Environmental Protection targets	Direction	Minimal Distance (m)	Environmental Quality Standard (level)
					traffic are minimized.
		Note: Key road section associated with "tourism" and "traffic" impacts is Xiayingfang Section of West Street.			

Note: The construction sites of Chengde Subproject are located far away from the World Cultural Heritage of "the Mountain Resort and its Outlying Temples" and outside the control zones specified by local government. Therefore, based on the preliminary identification results, substantially no negative impacts will be produced during construction of the subproject.

Table 1-7-3 Key Environmental Protection Targets of Pingshan Subproject

A) Ordinary environmentally sensitive targets						
Environmental elements	**Scope of Works**	**Environmental protection targets**		**Direction**	**Minimal distance (m)**	**Environmental quality standard (level)**
Sound, air environment	New construction of pipelines	Longxingmingdu Shops (under construction)	Gangcheng Road	W	21	Class II and 4a standard of the Sound Environment Quality Standard (GB3096-2008) Class II standard of the Ambient Air Environment Quality Standard (GB3095-2012)
		Runjing Gardens Shops (under construction)		W	21	
		Kangxin Homes Residential Community		E	42	
		Longhe Homes Residential Community		E	49	
		Xiangxielidu Residential Community(under construction)	Zhongshan West Road	S	60	
		Binheyayuan Residential Community(under construction)		S	55	
		Pingshan County Hospital		WN	58	
		Yuehe New City (under construction)	Xibaipo West Road	EN	70	
		Xibaipo No. 2 Middle School		EN	70	
		Huibinlou Hotel		N	30	
		Longcheng Gardens		S	80	
		Longcheng Gardens	Hexi Street	W	41	
		Yehe Pearl Residential Community		W	25	
		Mingzhu Park		E	23	
		Zizhuyuan Residential Community	Dongchuan Street	E	20	
		Gaocun Village		N	20	
		Feicheng International Residential Community	Power Plant and Feicheng International	EN	25	
Social environment		Intersection with Wanshou Road	Gangcheng Road	/	/	
		Local water supply pipelines, wastewater pipelines, underground power cables, optical cables, telecommunication		/	/	

		cables and fuel gas pipelines				
		Local water supply pipelines, wastewater pipelines, underground power cables, optical cables, telecommunication cables and fuel gas pipelines	Zhongshan West Road	/	/	
		Intersection with Zhongshan West Road	Hexi Street	/	/	
		Local water supply pipelines, wastewater pipelines, underground power cables, optical cables, telecommunication cables and fuel gas pipelines		/	/	
Sound, air environment	Reconstruction of old pipelines	Pingshan Branch of ICBC	Jianshe North Street	E	35	
		Pingshan County Workers' Hospital		W	6	
		Pingshan Branch of BOC		E	35	
		Yujing International Residential Community		W	40	
		Jurisdiction Bureau		W	6	
		Food and Grain Bureau		W	6	
		Pingshan County Price Administration Bureau		E	35	
		Jian'an Residential Community	Xibaipo East Road	N	10	
		Anju Residential Community		N	10	
		Pingshan County Post Administration Bureau		N	15	
		Pingshan County Finance Bureau		N	15	
		Pingshan County Industrial and Commercial Administration Bureau		N	15	
		Rongchang Hotel		S	40	
		Jingye Hotel		S	40	
		Bank of China Safety Residential Community		S	40	
		TVET Center	Xianbiao North Street	E	60	
		Xingshang Plaza		W	10	
		Jingxiu Garden Residential Community	Hongqi South Street	W	10	
		Shidaicheng Residential Community		W	18	
		Beijie Village		E	45	
Social environment		Intersection with Wanshou Road	Jianshe North Street	/	/	Class II and 4a standard of the

		Intersection with Jingye Road		/	/	Sound Environment Quality Standard (GB3096-2008) Class II standard of the Ambient Air Environment Quality Standard (GB3095-2012)
		Local water supply pipelines, wastewater pipelines, underground power cables, optical cables, telecommunication cables and fuel gas pipelines		/	/	
		Intersection with Dongchuan Street	Xibaipo East Road	/	/	
		Intersection with Andong Street		/	/	
		Intersection with Hongqi North Street		/	/	
		Local water supply pipelines, wastewater pipelines, underground power cables, optical cables, telecommunication cables and fuel gas pipelines		/	/	
		Local water supply pipelines, wastewater pipelines, underground power cables, optical cables, telecommunication cables and fuel gas pipelines	Xianbiao North Street	/	/	
		Intersection with Pingnan Road	Hongqi South Street	/	/	
		Local water supply pipelines, wastewater pipelines, underground power cables, optical cables, telecommunication cables and fuel gas pipelines		/	/	

B) Special environmentally sensitive targets

Environmental elements	Scope of Works	Environmental protection targets	Contents of key impacts	Environmental quality standard
Social environment	New Construction of pipelines	Gangcheng Road : Shuohuang Railway	Crossing via the thermal pipeline laid in the culvert beneath the railway	Adverse impacts on normal traffic are minimized.
		Power Plant and Feicheng International: Dianchang Road (urban section of Provincial Highway S301)	Crossing underneath Provincial Highway S301 by means of pipe jacking	
		Intersection of Hexi Street with Xibaipo West Road	Crossing by means of open excavation	
	Reconstruction of old pipelines	Intersection of Xiebiao North Street with Xibaipo East Road	Crossing by means of open excavation	

Table 1-7-4 Key Environmental Protection Targets of Xingtai Subproject

A) Ordinary environmentally sensitive targets					
Environmental elements	**Scope of Works**	**Environmental protection targets**	**Direction**	**Minimal distance (m)**	**Environmental quality standard (level)**
Air environment, sound environment	Construction of heating pipelines	73 residential communities, 8 schools and 9 hospitals	/	50m away	Class II and 4a standard of the Sound Environment Quality Standard (GB3096-2008) Class II standard of the Ambient Air Environment Quality Standard (GB3095-2012)
Social environment		Streetside shops	/	/	Adverse impacts are minimized.
Traffic impacts		Xingzhou Avenue, Jinquan Street, Renmin Street, Kaiyuan North Road, Kaiyuan Road, Quanbei Street, Quannan Street, Tuanjie Street, Xinhua Road, Xingda Road, Yejin Road, Gangtie Road, Taihang Road, Lianchi Street	/	/	Adverse impacts on normal traffic are minimized.
B) Special environmentally sensitive targets					
Environmental elements	**Scope of Works**	**Environmental protection targets**	**Direction**	**Minimal distance (m)**	**Environmental quality standard (level)**
Air environment, sound environment	Construction of heating pipelines and heat exchange station	Yihai Garden	W	30	Class II standard of GB3095-2012 Class 2 standard of GB3096-2008
		Fengchaoyuan	W	30	
		Quandu City	N	50	
		Tianhe Renjia	W	20	
		Dexinyuan	N	30	
		Shijimingdu	N	50	
		Zhaicun Residential Community	S	50	
		Community Hospital	N	50	
		Nature City	N	50	
		Longqiang Gaozhu Residential Building	S	40	
		Xueyuan Apartment	S	50	
		Yijinyuan	N	30	
		Hongshengyaju Residential Community	S	50	
		Hexie Homes	NS	30	
		Paper Mill Dormitory Building	N	30	
		Yinfa Residential Community	N	40	
		Yongkang City Park	S	30	
		Guangming Residential Community	S	40	
		Transformer Plant Residential Community	S	30	
		Chassis Plant Residential Community	S	30	
Traffic impacts	Construction of	Provincial Highway S221	Content of key impacts:		Adverse impacts on normal

	heating pipelines		pipeline construction activities in the neighborhood	traffic are avoided during construction.
		Jingjiu Railway	Content of key impacts: pipeline crossing construction under the railway (jacking)	Adverse impacts on normal traffic are avoided during construction.
		Intersections: Xingzhou Avenue – Xiangdu Road, Xingzhou Avenue – Kaiyuan Road, Xingzhou Avenue – Kaiyuan Road, Xingzhou Avenue – National Highway 107, Yejin Road – Quanbei Street, Renmin Street – Yurang Bridge Road, Xingda Road – Lianchi Street, Kaiyuan Road – Quanbei Street, Kaiyuan Road – Quannan Street, Xiangdu Road – Dongguan Street	Contents of key impacts: Impacts generated by pipeline construction on existing water supply and drainage pipelines, electrical cables, telecommunication cables, gas pipelines, etc..	Adverse impacts on normal traffic are avoided during construction.

Table 1-7-5 Key environmental protection targets of Zhangjiakou Subproject

Environmental elements	Scope of Works	Environmental protection targets	Direction	Minimal distance (m)	Environmental quality standard (level)
A) Ordinary environmentally sensitive targets					
Air environment, sound environment	Construction of heating pipelines	22 residential communities, 1 school	/	50m away	Class II and 4a standard of the Sound Environment Quality Standard (GB3096-2008) Class II standard of the Ambient Air Environment Quality Standard (GB3095-2012)
B) Special environmentally sensitive targets					
Sound environment, air environment	Pressure isolation heat exchange station	No. 3 Residential Building of China Unicom	N	10	Class 2 standard of the Sound Environment Quality Standard (GB3096-2008) for Class 2 sound environment function zones. Class II standard of the Ambient Air Environment Quality Standard (GB3095-2012) for Class 2 air environment function zones.
		Staff Residential Building of No. 251 Hospital	W	6	
	Construction of heating pipeline	Miaomiao Kindergarten of Hi-tech Zone	E	40	Class 2 standard of the Sound Environment Quality Standard (GB3096-2008) for Class 2 sound environment function zones. Class 4a standard of the Sound Environment Quality Standard (GB3096-2008)
		Municipal Construction Bureau of Qiaodong District, Zhangjiakou	E	30	
		Construction and Environmental Protection Bureau of Qiaodong District, Zhangjiakou	E	30	

		Qiaodong Branch of Zhangjiakou Land & Resources Bureau	W	26	will apply to the Class 4 noise function zone of the roadside area where the first row of the buildings of three or more stories outside the red line of the urban trunk roads of Wuyi Street, Shenli Middle Road, Shengli North Road, Jianguo Road, Dongxing Street, Class II standard of the Ambient Air Environment Quality Standard (GB3095-2012) for Class 2 air environment function zones.
		Hebei Zhangjiakou Radio Administration Bureau	E	40	
		Gongrencun South Community Traffic Police Staff Residential Community	E	30	
		Zhangyuan New City	E	50	
		Residential Buildings of Municipal Industrial and Commercial Administration Bureau	W	25	
		People's Government of Qiaodong District, Zhangjiakou City	W	45	
		Rongchen Gardens	W	50	
		Meihuixian Residential Community	E	40	
		Weihua Primary School	E	27	
		Education Bureau of Qiaodong District, Zhangjiakou City	E	27	
		Employment Service Bureau of Zhangjiakou City	W	35	
		Victoria Plaza Residential Community	N	43	
		Chahaer Martyr Tombs	E	15	
Traffic impacts	Construction of heating pipelines	Intersection of Shengli Middle Road and Shenghua West Street	Contents of key impacts: pipeline construction activities in the neighborhood		Adverse impacts on normal traffic will be avoided during construction.
		Intersections of Shengli North Road and Jianguo Road and Hongqi South Road			
		Intersections of Shengli North Road and Jianshe East Road			
		Intersections of Shengli North Road and Wuyi Street			
		Weihua Primary School			
Social impacts	Construction of heating pipelines	Intersection of Shengli Middle Road and Shenghua West Street	Contents of key impacts: Impacts generated by pipeline construction on existing water supply and drainage pipelines, electrical cables, telecommunication cables, gas pipelines, etc..		Adverse impacts will be avoided during construction.
		Intersections of Shengli North Road and Jianguo Road and Hongqi South Road			
		Intersections of Shengli North Road and Jianshe East Road			
		Intersections of Shengli North Road and Wuyi Street			
Associated	Construction of	Yanghe	Contents of key impacts:		Adverse impacts on normal

project: Gas-fired pipeline under planning	natural gas pipelines	Jing-Bao Railway Xuanhua Section	undercrossing or overcrossing of pipelines	operation of highways and railways and river water quality will be avoided during the construction.
		Hachaer Street		
		Beijing – Tibet Expressway		

1.9 EIA Work Procedure

According to relevant national environmental impact assessment requirements, environmental impact assessment shall have following three stages:

1) Project preparation: The key activities in this stage include preliminary survey of environmental condition in the project area, site survey of the proposed project sites, consultation and communication with local government bodies, study of project documents (including design documents), preliminary engineering analysis and carrying out work activities such as identification of key stakeholders, screening of key EIA factors and determination of EIA levels.

2) Environmental impact assessment: The key activities in this stage include in-depth survey of environmental condition, further analysis of impacts from the construction of the Project, identification of specific contents of environmental impacts, theme evaluation based on status quo monitoring, public participation and development mitigation measures and management plan of environmental impacts.

3) Report preparation: The key activities in this stage include summarizing and analyzing the various data and information as collected and working out a conclusion, making comments and recommendations to the employer and finalizing the preparation of EIA Report.

1.10 EIA Team

Hebei Foreign Debt Management Center has hired NAREE Consulting Limited to undertake project preparatory and is responsible for preparation of the project feasibility study report, EIA report, and resettlement plan. These reports will be submitted to the World Bank through Hebei Foreign Debt Management Center.

2. Legal Framework and Analysis of Relevance

2.1 National Laws and Regulations

2.1.1 National Laws

1) PRC Environmental Protection law, implemented since Jan.1, 2015;
2) PRC Law on Prevention and Control of Environmental Pollution by Solid Wastes, (amended and implemented since June. 29, 2013);
3) PRC Law on Water and Soil Conservation, implemented on Dec. 25, 2010;
4) PRC Law on the Prevention and Control of Water Pollution, implemented on Jun. 1, 2008;
5) PRC Law on Energy Conservation, implemented on April 1, 2008
6) PRC Law on the Protection of Cultural Relics, implemented on Dec. 19, 2007
7) PRC Law on Environmental Impact Assessment, implemented on Sep. 1, 2003
8) PRC Law on Promotion of Clean Production, Implemented on June 1, 2003;
9) PrC Law on Prevention and Control of Air Pollution, implemented on Sept. 1, 2000
10) PRC Law on Prevention and Control of Pollution from Environmental Noise, implemented on Mar. 1, 1997

2.1.2 National Regulations

1) Ordnance of Urban Drainage and Sewage Treatment (State Council Order No. [2014]641)
2) Notice on Issuing the "Detailed Rules of Implementation of the Action Plan of Air Pollution Prevention and Control in Beijing, Tianjin and Hebei and the Surrounding Areas" (State Council Doc. No. [2013]104)
3) Notice by the State Council on Issuing the Air Pollution Prevention and Control Plan (State Council Doc. No. [2013]37)
4) Notice on Issuing the Guidelines of Facilitating Joint Prevention and Joint Control of Air Pollution and Improving Regional Air Quality" (State Council General Office Doc. No. [2010]33)
5) Ordnance of the People's Republic of China on Government Information Disclosure (State Council Order No. [2008]492)
6) Notice by the State Council on Issuing the Air Pollution Prevention and Control Plan (State Council Doc. No. [2013]37)
7) Decision by the State Council on Implementing the Concept of Scientific Development and Strengthening Environmental Protection (State Council Doc. No. [2005]39;
8) National Outline of Ecological Environment Protection (State Council Doc. No. [2000]38)
9) Ordnance of Environmental Protection and Management of Construction Projects (State Council Order No. [1998]253)
10) Natural Reserve Ordnance of the People's Republic of China (State Council Order No. [1994]167)

2.1.3 Rules

1) Catalogue of Environmental Impact Assessment Classification and Management of Construction Projects (MEP Order No.[2015]33)

2) Notice by the General Office of Ministry of Environmental Protection on Implementing the Air Pollution Prevention and Control Action Plan and Strictly Enforcing Environmental Impact Assessment Permit System (MEP Doc. No. [2014]30)

3) Detailed Rules of Implementation of the Action Plan of Air Pollution Prevention and Control in Beijing, Tianjin and Hebei and the Surrounding Areas (MEP Doc. No. [2013]104

4) Notice on Issuing the Guidelines of Government Information Disclosure of Environmental Impact Assessment of Construction Projects (MEP-Office Doc. No. [2013]103

5) Catalogue for the Guidance of Industry Restructuring (amended in 2011) (NDRC Order No. [2013]21

6) Notice on Issuing the Program of Determining Key Cities for Air Pollution Prevention and Control (MEP Doc. No. [2012]164

7) Notice on Issuing the "12th Five-year Plan" of Air Pollution Prevention and Control in Key Regions (MEP Doc. No. [2012]130

8) Notice on Strengthening Risk Precaution and Strictly Managing Environmental Impact Assessment (MEP Doc. No. [2012]98)

9) Notice on Further Strengthening Management of Environmental Impact Assessment and Preventing Environmental Risks (MEP Doc. No. [2012]77)

10) Requirements on Drafting and Preparation of Environmental Impact Assessment Summary Report of Construction Projects (MEP Announcement No. [2012]51)

11) Stipulations on Level-by-level Review and Approval of Environmental Impact Assessment Documents of Construction Projects (MEP Doc. No. [2009]5)

12) Provisional Methods of Public Participation in Environmental Impact Assessment (MEP Doc. No. [2006]28)

13) Provisional Methods of Management of Projects Financed by International Financial Institutions and Foreign Governments (NDRC Order No. [2005]28)

14) Management Methods of Final Acceptance of Environmental Protection Aspects of Construction Projects (SEPA Order No. [2002]13)

15) Program for Promoting Clean Production Technologies in Major Industries (Ministry of Industry and Information Technology, Document [2014] No.273)

2.2 Local Regulations and Standard Documents

1) Ordnances of Public Participation in Environmental Protection in Hebei Province (implemented on January 1, 2015)

2) Implementing Scheme of Action Plan of Atmospheric Pollution Prevention and Control (CCP Committee and People's Government of Hebei Province, Sept. 6, 2013)

3) Notice on Issuing the (Provisional) Emergency Management Methods of Heavy Air Pollution in Hebei Province (JiZheng Letter No. [2013]33)

4) (Trial) Opinions of the People's Government of Hebei Province on the Implementation of

Banned (Restricted) Regional Construction Projects (JiZheng No. [2009]89)

5) Views on Promoting Energy Saving and Emission Reduction (JiZheng No. [2008]11)

6) Several Opinions of the People's Government of Hebei Province on Addressing Livelihood Issues with Full Efforts (JiZheng No. [2008]11)

7) Methods of Supervision and Management of Environmental Pollution Prevention and Control in Hebei Province (Hebei Provincial Government Order No. [2008]2)

8) Stipulations on Utilization and Management of Materials and Equipment in Construction Projects in Hebei Province (Hebei Provincial Government Order No. [2007]14)

9) Opinions of the People's Government of Hebei Province on Implementing the "Decisions of the State Council on Implementing the Concept of Scientific Development and Strengthening Environmental Protection" (JiZheng No. [2006]65)

10) Implementation Program for Improving Clean Production Performance of Major Industries in Hebei Province, issued by Hebei Province Industry and Information Technoloogy Bureau, 6 August 2014

11) Environmental Protection Ordnances of Hebei Province (Amended on March 25, 2005)

12) Water Pollution Prevention and Control Ordnances of Hebei Province (Implemented on October 25, 1997)

13) Environmental Protection and Management Ordnances of Construction Projects in Hebei Province (Implemented on Dec. 17, 1996)

14) Air Pollution Prevention and Control Ordnances of Hebei Province (Implemented on Nov. 3, 1996)

15) Water Resource Management Ordnances of Hebei Province (Implemented on Dec. 23, 1985)

16) Notice on Further Strengthening Environmental Protection Management of Construction Projects (Ji EIA No. [2013]232)

17) Opinions on Further Strengthening the Work of Pollution Prevention and Control (JiHuanFang No. [2012]224)

18) Notice on Further Strengthening the Operational Supervision of Pollution Prevention and Control Facilities (JiHuanZong No. [2011]249)

19) Notice on Further Strengthening Technical Review of Environmental Impact Assessment (JiHuanBan No. [2011]186)

20) Notice on Issuing the Key Requirements on Preparation of Reports of Technical Review of Environmental Impact Assessment of Construction Projects (JiHuanBan No. [2010]250)

21) Notice on Further Strengthening Public Participation in EIA of Construction Projects (JiHuanBan Doc. No. [2010]238)

22) Notice on Issuing the Environmental Protection Planning of Hebei Province for Centralized Drinking Water Sources for Cities (2008-2020) (JiHuanKong No. [2009]5)

23) Notice on Issuing the Protection Zones of Centralized Drinking Water Sources for Cities in Hebei Province (JiHuanKong No. [2009]4)

24) Notice on Strengthening Total Amount Management of Major Pollutants Emissions (JiHuanKong No. [2008]23)

25) Stipulations on Strengthening Management of the Preparation of Environmental Impact

Assessment Documents (JiHuanBan Doc. No. [2007]163)

26) Provisional Stipulations on A Number of Issues about Environmental Protection Management of Construction Projects (JiHuanBan Doc. No. [2007]65)

27) Notice by Hebei Province Environmental Protection Bureau on Strengthening Environmental Protection and Facilitating Pollutant Emission Reduction (JiHuan No. [2007]3)

28) Implementation Details of Implementing Air Pollution Prevention and Control Action Plan in Chengde City (ChengFa Doc. No. [2013]20)

29) Notice of Issuing the Implementation Plan of Critical Actions of Environmental Management in Chengde City (2013-2017) (ChengFa Doc. No. [2013]19)

30) Notice of Issuing the Opinions of Chengde City on Implementation of Regional Banned (Restricted) Construction Projects in Hebei Province (Chengde Municipal Government – ZhengBan Doc. No. [2009]136)

31) Notice of the People's Government of Pingshan County on Issuing the "2014 Work Program of Critical Air Pollution Prevention and Control Actions in Pingshan County" (June 20, 2014);

32) Atmospheric Pollution Prevention Action Plan (2013-2017) in Shijiazhuang City;

33) (Provisional) Plan of Emergency Response to Heavy Pollution Weathers in Shijiazhuang City (ShiZhengFa Doc. No. [2013]34);

34) Methods for Prevention and Control of Dust Pollution on Construction Sites of Construction Projects in Shijiazhuang City (Order No. 185 of the People's Government of Shijiazhuang Municipality);

35) Standards for Management of Dust on Construction Sites of Construction Projects in Shijiazhuang City (Order No. 140 of the People's Government of Shijiazhuang Municipality);

36) Implementatio Details for Air Pollution control Action Plan of Xingtai City (2013 to 2017), issued by Xingtai Municipal Government, 12 November 2013

37) Guidance of the Municipal Public Utility Administration Bureau of Zhangjiakou City on Development of District Heating in the Urban Center (Zhangjiakou Public Utility Bureau Doc. No. [2014]105);

38) Notice of the General Office of the People's Government of Zhangjiakou City on Issuing the Notice of "Relevant Policies of Implementation of Urban District Heating" Jointly Issued by Municipal Public Utility Administration Bureau and Two Other Government Departments (Government Office Doc. No. [2010]72)

2.3 Technical Specifications and Standards

2.3.1 Chinese Technical Specifications and Standards

1) HJ2.1-2011 Technical guidelines for environmental impact assessment-General principles

2) HJ2.2-2008 Technical guidelines for environmental impact assessment- Atmospheric environment

3) HJ/T2.3-93 Technical guidelines for environmental impact assessment- Surface water environment

4) HJ610-2011 Technical Guidelines for Environmental Impact Assessment - Ground Water Environment

5) HJ2.4-2009 Technical guidelines for noise impact assessment – Accoustic environment

6) HJ19-2011 Technical guidelines for environmental impact assessment- Ecological environment

7) HJ/T 169-2004 Technical Guidelines for Environmental Risk Assessment on Projects

8) T16453.1~6-96 Technical Specifications on Comprehensive Management of Water and Soil Conservation

9) (Trial) Guidelines on Identification of Solid Wastes (SEPA Announcement No. (2006)11)

10) Ambient Air Quality Standard (GB3095-2012)

11) Environmental quality standards for Noise (GB3096-2008)

12) Environmental Quality Standard for Surface Water (GB3838-2002)

13) Ground Water Quality Standard (GB/T14848-1993);

14) Ambient Air Quality Standard (GB16297-1996)

15) Emission standard of Air pollutant of Thermal Power Plant (GB13223-2011) .

16) Emission Standard for Boiler Air Polllutant (GB13271-2014)

17) Water Quality Standard for Sewage Discharged into Municipal Sewers (CJ343-2010)

18) Code of Design of Treatment of Industrial Circulating Cooling Water (GB5050-2007)

19) Emission Standard of Environment Noise for Boundary of Construction Site (GB 12523-2011)

20) Emission Standard of Environment Noise for Boundary of Industrial Enterprises (GB 12348-2008)

21) Technical Specifications for Continuous Monitoring of Thermal Power Plant Fume Emission (HJ/T 75-2001)

22) Code for sound insulation design of civil buildings (GB50118-2010)

23) Standard for Pollution Prevention and Control on the Storage and Disposal Site for General Industrial Solid Wastes (GB 18599-2001)

2.3.2 The World Bank's Safeguard Policies and WB EHS Guidelines

1) World Bank OP 4.01 Environmental Impact Assessment

2) World Bank OP 4.12 Involuntary Resettlement

3) World Bank OP 4.37 Dam Safety

4) World Bank OP 4.11 Physical Cultural Resources

5) World Bank OP 4.10 Indigenous Peoples

6) World Bank OP 4.04 Natural Habitat

7) World Bank OP 4.60 Projects in Disputed Areas

8) World Bank OP 7.50 Projects on International Waterways

9) World Bank General Guidelines for Environment, Health and Safety, May 2010

10) World Bank Environment, Health and Safety Guidelines for Thermal Power Plants, December 2008

2.4 Urban Planning, Air Pollution Prevention and Control Planning and Environmental Function Zoning Documents

1) Ecological Environment Development Planning of Hebei Province (1999);
2) Water Function Zoning of Hebei Province issued by Hebei Province Water Conservancy Department and Environmental Protection Bureau (JiShuiZi [2004]2)
3) "12th Five-year Plan" for Air Pollution Prevention and Control in Key Regions
4) Outline of the 12th Five-year Plan of National Economy and Social Development in Hebei Province
5) Main Functional Zonning of Hebei Province
6) Urban Master Plan of Chengde City (2008-2020)
7) Urban Center Heating Planning of Chengde City (2010-2020)
8) Famous Historical City Protection Planning
9) Famous Scenic Site Protection Planning of Chengde City
10) Notice on Issuing the "Detailed Requirements on Implementing the Air Pollution Prevention and Control Action Plan of Chengde City (2013-2017)" (Chengde Municipal Government Chengfa No. [2013]20)
11) Ecological Function Zoning of Chengde City
12) Planning of Key Water Source Culturing and Ecological Function Protection Zones of Chengde City
13) Critical Action Plan of Air Pollution Prevention and Control of Shijiazhuang City (2013-2017), issued by CCP Committee and People's Government of Shijiazhuang City and implemented on Sept. 30, 2013;
14) Opinions of Pingshan County Land and Resources Bureau on Land Use for the World Bank Financed Project of Energy-efficient Reform to the District Heating Facilities in Urban Center of Pingshan County, Hebei Province
15) Approval by Pingshan County Urban-Rural Planning Bureau on Site Selection of the World Bank Financed Project of Energy-efficient Reform and Expansion of District Heating Facilities in Urban Center of Pingshan County, Hebei Province
16) Urban Master Plan of Xingtai City (2008-2020)
17) Ecological Development Plann of Xingtai City
18) The "12th Five-year Plan" of Environmental Protection of Xingtai County
19) Outline of the "12th Five-year Plan" of National Economy and Social Development in Xingtai City
20) Comprehensive Implementation Plan of Xingtai City on Energy Saving and Emission Reduction in the "12th Five-year Plan" Period;
21) Notice on Issuing the Detailed Requirements on Implementation of the Air Pollution Prevention and Control Action Plan of Xingtai City (Xingtai Municipal Government Xingfa No. [2013]10)
22) Sector Plan of Urban Heating of Xingtai City (2013-2020);

23) Urban Master Plan of Zhangjiakou City (2000-2020) ；
24) Ambient Air Quality Function Zoning of Zhangjiakou City
25) Outline of the 12th Five-year Plan of National Economy and Social Development in Zhangjiakou City;
26) "12th Five-year Plan" of Environmental Protection in Zhangjiakou City
27) Heating Planning of Urban Center and Dongshan and Xishan Industrial Clusters of Zhangjiakou City (2008-2020);
28) An Official Letter of Zhangjiakou Public Utility Administration Bureau on Planning of the Project of Heat Source Reform and District Heating Utilizing the Power Generator Units of Zhangjiakou Power Plant (Municipal and Public Utility Administration Bureau Letter No. [2013]5).

2.5 World Bank Safeguard Policy and Environment, Health and Safety (EHS) Guidelines

2.5.1 Analysis of Policy Relevance

World Bank Safeguard Policies relevant to the Project mainly include OP4.01 (Environmental Impact Assessment), OP 4.12 (Involuntary Resettlement) and OP 4.37 (Safety of Dams). Analysis of relevance between the Project and the World Bank Safeguard Policies is shown in **Table 2-1**.

Table 2–1 Analysis of Relevance of World Bank Safeguard Policies

WB Safeguard Policy	Relevant or Irrelevant				Remarks
	Chengde	Pingshan	Xingtai	Zhangjiakou	
OP4.01 Environmental Impact Assessment	**Relevant**	**Relevant**	**Relevant**	**Relevant**	The Project will produce certain impacts on the surrounding environment during the construction period and minor noise impacts during the operation period, thus requiring EIA. Through environment screening, the World Bank has identified the Project as Category A.
OP4.12 Involuntary Resettlement	**Relevant**	**Relevant**	**Relevant**	**Relevant**	The Project involves no land acquisition and resettlement. However, some subprojects involve removal of small boiler houses, thus involving worker reemployment.
OP4.37 Safety of Dams	Irrelevant	Irrelevant	**Relevant**	Irrelevant	1) The heat source enterprise under Xingtai Subproject uses Yangwowan Reservoir as its water source, thus involving safety of reservoir dam during the operation period. WB Safety of Dams Specialist has conducted a site visit and safety assessment of the reservoir dam and confirmed that the dam is safe. 2) Chengde, Pingshan and Zhangjiakou Subprojects involve no dam issues.
OP4.11 Physical Cultural Resources	Irrelevant	Irrelevant	Irrelevant	Irrelevant	1) There are cultural relics protection units in the urban areas of Chengde and Zhangjiakou. However, as the construction areas of both subprojects are located outside the protection zones determined by the cultural relics protection units and the areas of restricted development determined by the local governments, thus producing no adverse impacts on the cultural relics, they may be considered as irrelevant to the Project. 2) There are no cultural relics in the urban areas of Pingshan and Xingtai.

OP4.10 Indigenous People	Irrelevant	Irrelevant	Irrelevant	Irrelevant	The project area involves no indigenous people and the construction areas of the Project are not ethnic minority areas.
OP4.04 Natural Habitat	Irrelevant	Irrelevant	Irrelevant	Irrelevant	No natural habitats and natural reserves are involved in the construction of the Project. No water system crossing works are included in the Project.
OP4. 60 Disputed Areas	Irrelevant	Irrelevant	Irrelevant	Irrelevant	The Project is not located in disputable areas.
OP7.50 International Waterways	Irrelevant	Irrelevant	Irrelevant	Irrelevant	The Project involves no international Waterways.

2.5.2 Comparison of EHS Guidelines and Standards

WB General Guidelines of Environment, Health and Safety (General EHS Guidelines), in particular, WB Environment, Health and Safety Guidelines for Thermal Power Plants (Thermal Power Plant EHS Guidelines) most relevant to the Project, contain standards and requirements on air pollutant, noise and sound environment quality, wastewater and solid waste management, occupational health and safety, etc.

Through comparative analysis of the domestic standards applicable to the Project and the standards contained in WB General Guidelines for Environment, Health and Safety and WB Environment, Health and Safety Guidelines for Thermal Power Plants, the assessment standards to be followed by the Project are finally determined. See the paragraphs below for the comparative analysis and results:

A. Environment Quality Standards

1) **Ambient Air Quality**: It is determined through comparative analysis that Class II standards specified in the Chinese National Standard of Ambient Air Quality Standard (GB3095-2012) will be enforced. See **Table 2-2** for the standard values of the respective indicators.

Table 2–2 Standard Concentration Limits of Ambient Air Quality Standards (Class II)

Name of Pollutant	Time Period	Concentration Limit	Unit	Scope of Application
SO2	Annual average	60	μg/m3	All parameters
	Daily average	150		
	Hourly average	500		
NO2	Annual average	40		
	Daily average	80		
	Hourly average	200		
PM10	Annual average	70	μg/m3	
	Daily average	150		
	Hourly average	--		
PM2.5	Annual average	35		
	Daily average	75		
	Hourly average	--		
TSP	Annual average	200		
	Daily average	300		
	Hourly average	--		

2) **Sound Environment Quality Standard**: **Table 2-3** shows the standard limits of the relevant sound environment quality indicators in the Chinese National Standard as well as the noise guidance values in WB EHS.

Table 2–3 Sound Environment Quality Evaluation Standard

Unit: Leq A (dB)

Sound Environment		GB 3096-2008 Standards		WBG EHS Standards	
Function of Area	**Noise Functional Area Category**	**Daytime 6:00~22:00**	**Night 22:00~6:00**	**Daytime 7:00~22:00**	**Night 22:00~7:00**
Residential, commercial and industrial mixed areas	Category 2	60	50	70	70
Areas mainly for residence, hospitals, cultural and educational institutions, administration offices	Category 1	55	45	55	45
Area on both sides of trunk road	Category 4a	70	55	--	--

It is known from the comparison between standards enforced in China and EHS enforced by WB in Table 2-3 that both standards have the same noise guidance value for sensitive sites of residential buildings, cultural and office units and medical institutions while the national standard has stricter standard values for boundary noise at residential, commercial and industrial mixed areas than WB EHS. It is therefore determined to carry out the assessment based on the Chinese national standard of "Sound Environment Quality Standard" (GB3096-2008).

On this basis, Class 2 standards included in the National Standard of "Sound Environment Quality Standard" (GB3096-2008) will be applied to boundary noises; Class 1 standards will be applied to sensitive sites while Class 4a will be applied to areas on both sides of trunk transportation routes.

3) **Surface Water Environment Quality**: It is determined through comparative analysis that the relevant water body standards specified in the Chinese National Standard of "Surface Water Environment Quality Standard (GB3838-2002) will be enforced based on the Water Function Zone Planning of Hebei Province. See **Table 2-4** for the standard values of the respective indicators.

Table 2–4 Surface Water Environment Quality Standard (Class III, Class IV water body standards)

Item	pH (no unit)	COD	BOD5	Ammonia Nitrogen	Petroleum
Limit value (mg/L) (Class III water body)	6-9	≤20	≤4	≤1.0	≤0.05
Limit value (mg/L) (Class IV water body)	6-9	≤30	≤6	≤1.5	≤0.5
Limit value (mg/L) (Class V water body)	6-9	≤40	≤10	≤2.0	≤1.0

4) **Ground Water Environment Quality**: It is determined through comparative analysis that the Class III standards specified in the Chinese National Standard of "Ground Water Environment Quality Standard (GB/T14848-93) will be enforced. See **Table 2-5** for the standard values of the respective indicators.

Table 2–5: Ground Water Environment Quality Standard (Class III standards)

No.	Parameter	Limit (mg/L)	No.	Parameter	Limit (mg/L)
1	pH (dimensionless)	6.5-8.5	9	Permanganate value	≤3.0
2	Sulfate	≤250	10	Fluoride	≤1.0
3	Total hardness	≤450	11	As	≤0.05
4	Soluble total solid	≤1000	12	Hg	≤0.001
5	Ammonia nitrogen	≤0.2	13	Cr(+6)	≤0.05

No.	Parameter	Limit (mg/L)	No.	Parameter	Limit (mg/L)
6	Nitrate notrogen	≤20	14	Cd	≤0.01
7	Nitrite nitrogen	≤0.02	15	Pb	≤0.05
8	Volatile phenol	≤0.002	16	Cyanide	≤0.05

B. Pollutant Emission Standards

1) Exhaust Gas Emission Standards

(a) **Dust in the construction period**: The Project Area is a Class II ambient air quality function zone and should meet the concentration limit standards for unorganized emission sources specified in Air Pollutant Comprehensive Emission Standard (GB16297-1996), with the standard values shown in **Table 2-6**. The major air pollutant in the construction period is total suspended particles (TSP).

Table 2–3 Some Limit Values in the Air Pollutant Comprehensive Emission Standard

Pollutant	Max. allowable Emission Rate (Unit: mg/m^3)
TSP	1.0 (unorganized)

(b) Thermal Power Plant Gas-fired Boiler Exhaust Gas: According to the requirements of the Ministry of Environmental Protection, exhaust gas emission for gas-fired boilers shall follow the relevant standard limits for gas-fired boilers specified in Emission standard of Air pollutant of thermal power plant (GB13223-2011). See **Table 2-7** for the standard limits specified in the Chinese national standard and the guidance values specified in WB Thermal Power Plant EHS Guidelines for the relevant indicators of exhaust gas emission.

Table 2–4 Standard Limits of Exhaust Gas Pollutant Emission of Gas-fired Boilers

Name of Pollutant	Unit	Emission Standard of air pollutant of thermal power plants (GB13223-2011)	Guiding values of exhaust gas emission specified in WB Thermal Power Plant EHS Guidelines
Fume	mg/Nm3	5	--
SO_2	mg/Nm3	35	--
NOx	mg/Nm3	100 (in NO2, 3% of basic oxygen content)	216 (in NO2, 3% of basic oxygen content)
Fume blackness	Grade	1	--

Note: The standard limits of NOx emission indicated in the table of the Chinese standard and WB Thermal Power Plant EHS Guidelines are equivalent values under the same state.

It is known from comparisons in Table 2-7 that the Chinese standard is stricter than WB EHS Guidelines. Therefore, the Chinese national standard of Emission standard of Air pollutant of thermal power plant (GB13223-2011) will be adopted for the assessment in the Project.

(c) Thermal Power Plant Coal-fired Boiler Exhaust Gas: See **Table 2-8** for the standard limits specified in the Chinese national standard and the guidance values specified in WB Thermal Power Plant EHS Guidelines for the relevant indicators of exhaust gas emission of coal-fired boilers. It is known from comparisons in the Table that the Chinese standard is stricter than WB EHS Guidelines. Therefore, the Chinese national standard of Emission standard of Air pollutant of thermal power plant (GB13223-2011) will be adopted for the assessment in the Project.

Table 2–8 Standard Limits of Exhaust Gas Pollutant Emission of Coal-fired Boilers

Name of Pollutant	Unit	Emission standard of air pollutant of thermal power plants (GB13223-2011)	Guiding values of exhaust gas emission specified in WB Thermal Power Plant EHS Guidelines

Fume	mg/Nm3	30	50
SO_2	mg/Nm3	200	900
NOx	mg/Nm3	200 (in NO2, 6% of basic oxygen content)	459 (in NO2, 6% of basic oxygen content)
Fume blackness	Grade	1	--

Note: The standard limits of NOx emission indicated in the table of the Chinese standard and WB Thermal Power Plant EHS Guidelines are equivalent values under the same state.

2) Wastewater Discharge Standard

Softening wastewater from the heat exchange stations: During operation of the Project, a small volume of wastewater will be generated, mainly being wastewater generated by the water softening system of the heat exchange stations. Instead of directly discharged into the environment, such wastewater will be discharged via pipelines into the urban sewer system and finally into the local municipal wastewater treatment plant. Water Quality Standard for Sewage Discharged into Municipal Sewers (CJ343-2010) Level B will be applied. Specific standard values of the key indicators are shown in **Table 2-9**.

Table 2–5 Water Quality Standard for Wastewater Discharged into Urban Sewers (Class B)

No.	Parameter	Unit	Standard Value
1	Suspended Solid	mg/L	400
2	Soluble total solid	mg/L	2000
3	pH value	mg/L	6.5-9.5

3) Noise control standard

(a) Boundary noise control standards during the construction period: It is determined that Emission Standard of Environment Noise for Boundary of Construction Site (GB 12523-2011) will be followed. See **Table 2-10** for the limit values.

Table 2–6 Environment Noise Control Standards for Boundary of Construction Sites

Daytime	Night
70 dB(A)	55 dB(A)
--	The magnitude of maximum noise level beyond the limit value in night shall not be greater than 15dB(A).

(b) Control standard for boundary noise in operation period: Control of boundary noise (including heat source plants) in the operation period will follow Class 2 standard of Emission Standard of Environment Noise for Boundary of Industrial Enterprises (GB 12348-2008); noise at sensitive sites will follow Class 1 standards of Emission Standard of Environment Noise for Boundary of Industrial Enterprises (GB 12348-2008) while the areas on both sides of trunk transportation routes will follow Class 4 standards of Emission Standard of Environment Noise for Boundary of Industrial Enterprises (GB 12348-2008). See **Table 2-11** for the limit values.

Table 2–7 Environmental Noise Control Standard for Boundary of Industrial Enterprises

Area Category	Daytime dB(A)	Night dB(A)
Category 1	55	45
Category 2	60	50
Category 4	70	55

C. Solid Waste Storage Standards

Disposal of solid wastes shall follow the Standard for Pollution Prevention and Control on the Storage and Disposal Site for General Industrial Solid Wastes (GB 18599-2001). Storage of hazardous wastes shall follow the Standard for Pollution Control on Storage of Hazardous Wastes (GB18597-2001). In addition, storage and disposal of hazardous wastes shall also meet the requirements of WB Environment, Health and Safety Guidelines and the respective safety policies.

2.5.3. Conclusions of Comparative Analysis

It is concluded from the comparative analysis of the various indicators and standard values in the Chinese standards and the WB Environment, Health and Safety Guidelines and Thermal Power Plant Environment, Health and Safety Guidelines that the Chinese standards are equal to or stricter than the various standards executed by WB. Therefore, it is determined that the assessment under the Project will be conducted in accordance with the Chinese standards.

2.6 Analysis of Consistency between the Project Construction and Urban Planning and Sector Policies

All the four subproject cities (counties) have developed and issued their urban master plans, according to which, each city (county) needs to increase urban district heating coverage and urban heating area in the near future. Therefore, it is an urgent mission for all these cities (counties) to increase district heating area, replace existing regional boiler houses and decentralized coal-fired small boilers and achieve CHP district heating and improve energy efficiency.

2.6.1 Chengde City

The basic principle determined in the “Heating Plan for the Urban Center of Chengde City (2010-2020)” is that “urban heating will be provided mainly relying on CHP, with regional peak load boiler houses and clean energy heating respectively playing a supportive and supplementary role. In addition, the urban center of Chengde City is divided into four heating areas, namely the Old Urban Center, the Southern Area, the Northern Area and the Western Area. The Heating Plan requires that the total heating area and total heating load of the Old Urban Center will respectively reach 1572.26×104m^2 and 707.52MW by 2015 and 1933.35×104m^2 and 870.01MW by 2020. By 2014, the Old Urban Center had achieved a heating area of 1225×104m^2 as it is now, with 8.7×104m^2 not yet covered by district heating and still heated by independent coal-fired small boiler houses in the region.

According to the Ecological Function Zone Planning of Chengde City and the Detailed Rules of Implementation of the Air Pollution Prevention and Control Action Plan of Chengde City (2013-2017) , the Old Urban Center of Chengde is a part of the Eco-city Construction Zone of Chengde and by the end of 2015 all the coal-fired boilers and hot-water furnaces with a capacity of 10 steam ton or less shall be eliminated in the urban area while 80% of the old residential buildings with renovation value shall be subject to heat metering and energy-saving renovation.

Covering the Old Urban Center of Chengde, the Chengde Subproject will achieve, upon completion, an increase of district heating area by 246.23×$10^4$$m^2$ and the removal of 6 Nos. coal-fired boilers with a capacity of 10 steam-ton or less in the region (involving a district heating area of 8.7×$10^4$$m^2$), accomplish the heat balance renovation to a total area of 150.09×$10^4$$m^2$, with totally 753 sets of pressure difference balance valves to be installed.

Implementation of Chengde Subproject will play a remarkable and positive role in realizing the objectives and requirements of district heating specified in the urban master plan and heating sector plan and the objectives of air pollution prevention and control action of Chengde City. The construction of the Subproject is consistent with the requirements of the sector policies and planning. Layout of the components of the Chengde Subproject is shown in **Figure 2-1**.

2.6.2 Pingshan County

According to the Master Urban Plan of Pingshan County Hebei Province (2008-2020), the land use in the urban center of the County Town will follow the “one-corridor”, “two-zone” and “two-axis” strategy. “Two-zone” refers to the two zones of Qiaodong and Qiaoxi constituting the Urban Center with Yehe River as the border while the “two-axis” refers to the two shopping and landscape axes of Baipo Road and Yehe Road running through the Urban Center. Large shopping facilities and key administrative bodies in the urban area are located on the two axes in a relatively centralized way. According to the Urban Heating Plan of Pingshan County (2013-2020), the planned district heating area by 2020 is 10,822,000m^2, including 8,637,000 m^2 for residential buildings and 2,185,000m^2 for public buildings. By then, the district heating coverage in the urban area of Pingshan County will reach 96.78%. By 2014, the total building area in the urban area of Pingshan County will reach 4,961,000m2 while the district heating area will reach 4,376,000m2, including 3,392,000m^2 for residential buildings and 984,000m^2 for public buildings.

Included in the construction scope of Pingshan Subproject are expansion and reconstruction of the primary network with a total length of 7,204m, construction of 36 heat exchange stations, energy-saving upgrading and reconstruction of 46 heat exchange stations and capacity expansion and reconstruction of 5 existing heat exchange stations, household heat metering renovation to 16,934 households (1,923,600m^2), heat metering renovation to 108 enterprises and public institutions, and construction of 1 automatic control and command center. Pipelines to be constructed under Pingshan Subproject are mainly along the two trunk roads of Yehe Road and Baipo West Road as well as the secondary trunk roads connected to them. The scope of heating includes parts of Qiaodong Block and Qiaoxi Block. The areas where the construction activities are implemented belong to the “two-axis” and “two-zone” referred in the planning. Upon the completion of the Subproject, heating area in the urban area of Pingshan County will increase by 3,031,200m^2.

Construction of Pingshan Subproject is consistent with the national and local sector policies and will play a remarkable and positive role in realizing the objectives and requirements of district heating specified in the master urban plan and special heating plan. Construction of the Subproject is consistent with requirements of the sector policies and planning. Layout of the components of the Pingshan Subproject is shown in **Figure 2-2**.

2.6.3 Xingtai City

The general urban layout and structure determined in the Master Urban Plan of Xingtai City (2008-2020) can be summarized as “one city, three districts, two centers and four axes”. “One city” refers to the area enclosed by Xingzhou Avenue, Baiquan Avenue, Binjiang Road and Xiangdu Road and forming the urban center of Xingtai City. “Three districts” refers to Longgang New District, High-and-New Technology Development Zone and Qilihe New District that mainly reflect the key direction of development of the city and will become the main carrier to ease the city functions. “Two centers” refers to the old urban center in Qiaodong District and the new urban center in Longgang New District. “Four axes” refers to Zhongxing Street running through Qiaodong District and Development Zone, Xingzhou Avenue, Gangtie Road in Qiaoxi District, and Qiaodong District. According to the requirements of the Master Urban Plan of Xingtai City and the Special Planning of Urban Heating of Xingtai City (2015-2020), by 2020, district heating will be realized for residential and public facilities in the urban center; CHP will be implemented where possible through renovation and reconstruction utilizing the existing heat sources. The heat sources for long term include Hebei Xingtai Thermal Power Plant, the chemical industry enterprises in Xingtai RISUN Chemical Industry Park and Xingtai CHP Plant.

At present, heating in Xingtai mainly includes CHP district heating and decentralized heating. In the project area, there is still a big gap in terms of district heating, with some small gas-fired boilers of low heating efficiency, high energy consumption and heavy pollution still in operation.

The key heat source of Xingtai Subproject is Hebei China Coal RISUN Coking Co., Ltd. located in the RISUN Chemical Industry Park (hereinafter referred to as “China Coal RISUN”). The Subproject

will achieve district heating using the circulating water of the primary cooler and CDQ residual heat boiler station of China Coal RISUN. The scope of district heating under the Subproject is the northwestern part of Xingtai City, specifically the area west of the railway to the east of Binjiang Road and north of Quanbei Street and the area east of the railway to the north of Tuanjie Street and west of Xiangdu Road.

Components to be constructed under Xingtai Subproject include the construction of 1 primary heating station, 11,600m long heat source water pipelines, 3,000m long steam pipelines, 550m long circulating water pipelines, 2,000m long condensation water pipelines and 52.187km long heating pipelines; construction or reconstruction of 130 conventional heating stations and 14 building-level heating stations. Upon completion of the Project, district heating will be achieved in a total area of 8,016,300m^2, with a heating capacity of 317.04MW. In addition, 22 small boiler houses will be shut down (and reconstructed into heating stations) and 40 small boilers will be removed.

Construction of Xingtai Subproject will realize the recycling of industrial waste heat, increase energy efficiency and facilitate the increase of district heating coverage in the urban area of Xingtai and help significantly reduce NG consumption. Implementation of heat source wastewater treatment, fume and dust control and residual heat utilization will facilitate realization of clean production and energy-saving and emission reduction objectives. Construction of Xingtai Subproject is consistent with national and local sector policies and will play a remarkable and positive role in realizing the objectives and requirements of district heating specified in the urban master plan and heating sector plan. Construction of the Subproject is consistent with the requirements of the sector policies and planning. Layout of the components of Xingtai Subproject is shown in **Figure 2-3**.

2.6.4 Zhangjiakou City

It is determined in the Urban Master Plan of Zhangjiakou City (2000-2020) that urban district heating will be developed and CHP plants will be constructed with no spared efforts in Zhangjiakou. According to the Plan, by 2020, Zhangjiakou will achieve an urban district heating coverage of 80% and a district heating capacity of 1100MW in total. According to the Heating Plan of the Urban Center of Zhangjiakou and East Mountain and West Mountain Industrial Cluster Zones (2008-2020), urban district heating in Zhangjiakou includes 5 heating zones, respectively being the Urban Center, the East Mountain Industrial Cluster Zone, the West Mountain Industrial Cluster Zone, Shanzhongcheng and Yanghe Zone. The Urban Center includes Qiaodong District, Qiaoxi District and the southern and northern parts of South New Town, involving a total planning area of 112km^2 and a total heating area of 49.9km^2. The heat source for the basic load in the Urban Center of Zhangjiakou City is provided by Zhangjiakou CHP Plant, Hebei Shenghua CHP Plant and the boiler houses of Dongyuan Heating Company. According to the requirements of Hebei Province, by the end of 2015, all the coal-fired boilers and hot water furnaces with a capacity of 10 steam ton or less in the urban center will be eliminated. By 2014, there had been 158 small coal-fired boilers continuing providing heating service in Qiaodong District only, with a total boiler capacity of 441.64t/h and involving 130 heating communities and a total heating area of 2,587,000m^2.

The scope of heating involved in Zhangjiakou Subproject covers most of the heating area in Qiaodong District. The components to be constructed under the Subproject include the construction of 1 No. pressure isolation heat exchange station with a heating area of 3,880,000m^2, construction of 20.5km long Level o and Level 1 high-temperature hot water pipelines, construction and reconstruction of 58 heating stations utilizing existing small boiler houses, construction of 17 building-level heating stations, reconstruction of 2 Nos. 70MW gas-fired hot water boilers utilizing existing coal-fired boilers and installation of building heat metering devices for 1,340 existing residential buildings.

Through construction of Zhangjiakou Subproject, CHP district heating will be realized in the

project area and energy efficiency will be promoted through replacement of the existing regional boiler houses and all decentralized coal-fired small boiler houses so as to facilitate the realization of the clan production and energy-saving and emission reduction objectives. Construction of the Subproject is consistent with the national and local sector policies and will play a remarkable and positive role in realizing the objectives and requirements of district heating specified in the master urban plan and special heating plan. Construction of the Subproject is consistent with the requirements of the sector policies and planning. Layout of the components of Zhangjiakou Subproject is shown in **Figure 2-4**.

2.6.5 Analysis Conclusion

As shown in the above analysis, construction of the Project will be helpful for accelerating the process of infrastructure network improvement and optimization of the four subproject cities and counties to improve their municipal infrastructures and living environment and reduce emission of air pollutants. In addition, construction of the Project will facilitate comprehensive construction of transportation, heating, gas supply and water supply and drainage and other public service infrastructure network and support the realization of the comprehensive urban functions and the air pollution control objectives of Beijing, Tianjin and Hebei. In summary, construction of the Project is consistent with the development strategies determined by the four cities / counties and will contribute to realization of the objectives set in the urban planning.

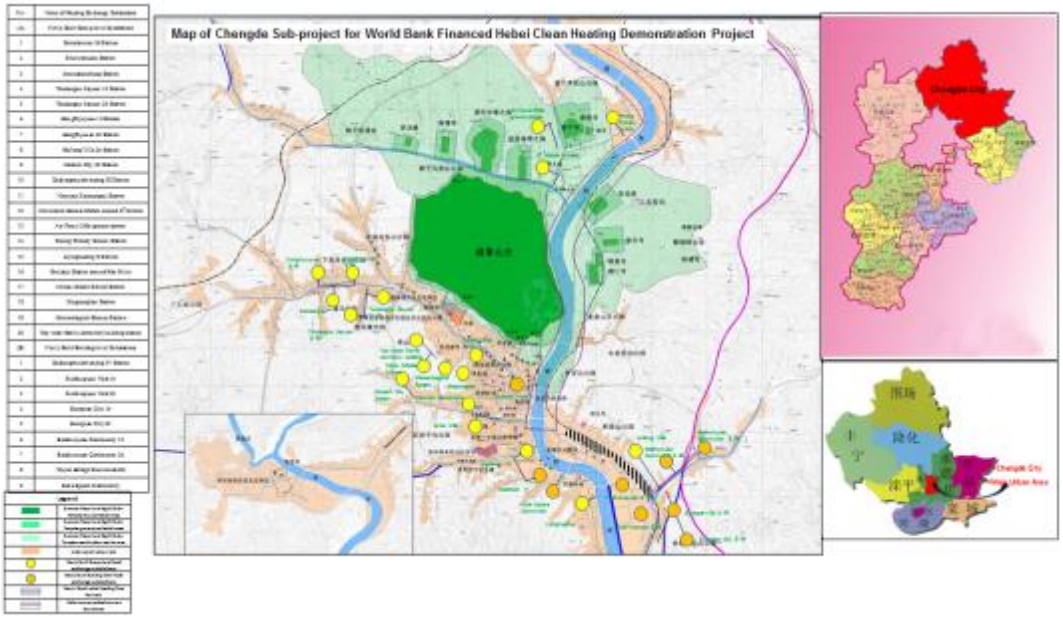


Figure 2-1 Layout Diagram of Chengde Subproject

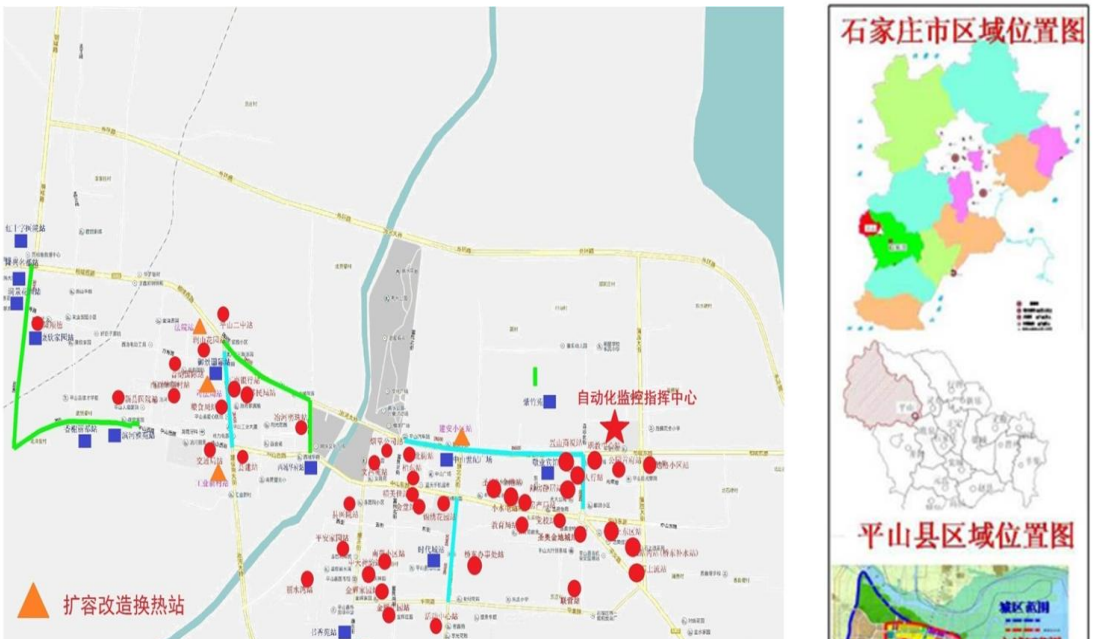


Figure 2-2 Layout Diagram of Pingshan Subproject

Figure 2-3 Layout Diagram of Xingtai Subproject

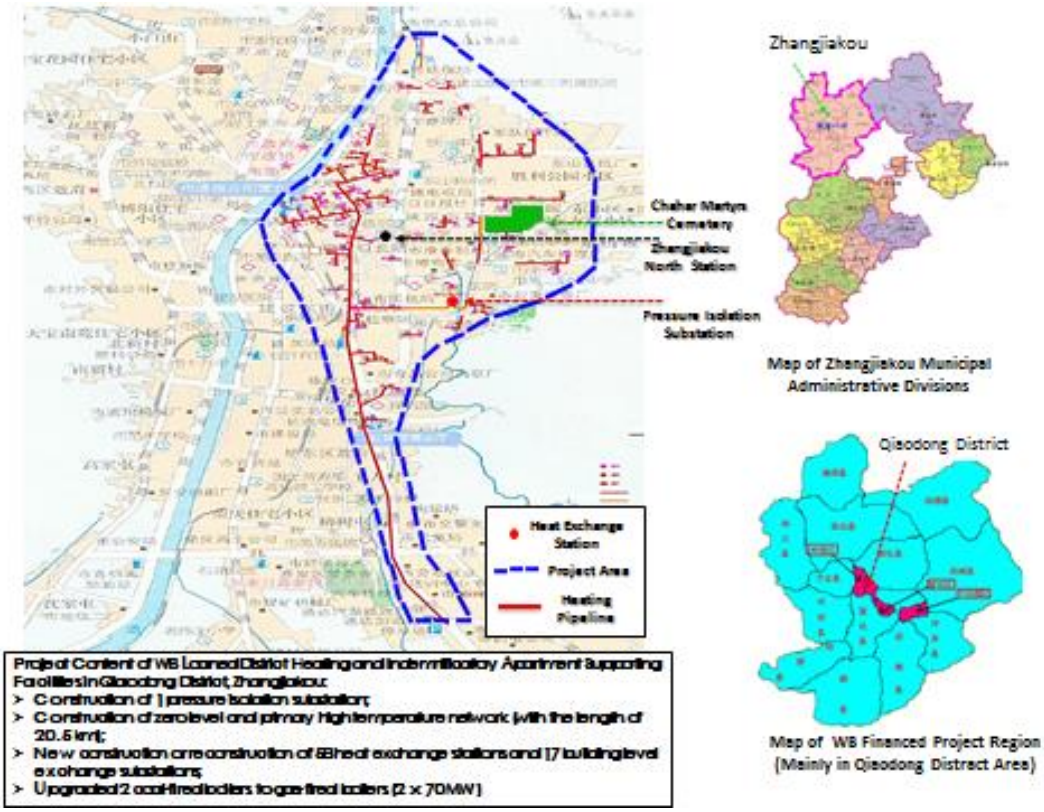


Figure 2-4 Layout Diagram of Zhangjiakou Subproject

3. Project Description

3.1 Project Background

The heating systems of each subproject county and city, are all unable to meet the needs of urban development and requirements of district heating, relatively low in terms of the level of heat source clean production and involving relatively heavy load in terms of energy-saving renovation, and need adjustment and reform to accommodate the more and more demanding environmental requirements as well as the life quality requirements of urban residents.

Objective of this project is to improve district heating. Implementation of the proposed project requires assurance of heat source and the heating capacity. Heat source of each subproject has been identified based on discussions during project preparation. Major features of the proposed project are shown in **Table 3-1**.

Table 3–1 Heat Source and Major Features of Each Subproject

Subproject	Heat Source and the Main Construction Contents of the Subprojects
Chengde Subproject	Luanhe Power Plant as the main supply of heat source and Northeast Suburb Heat Source Plant as peak load heat source to support district heating in Chengde city. The proposed subproject will construct heating networks and exchange stations to increase heating network capacity and service area.
Pingshan Subproject	Residual heat of Xibaipo Power plant is used as heat source of district heating. The proposed subproject aims to increase heating network capacity and energy efficiency. Therefore, this subproject will upgrade heating networks and heat exchange equipment and control system to increase service area and capacity of district heating.
Xingtai Subproject	Waste heat of circulating water of China Coal RISUN will be used as heat source of district heating in northwest Xingtai. This subproject will renovate equipment of the heat source enterprise, construct district heating pipelines and the primary substation in two phases.
Zhangjiakou Subproject	Zhangjiakou Power Plant plans to renovate 6 x 300MW units as district heating source for Zhangjiakou city proper. The subproject will construct DN1200 pipelines starting from Weier Road and along Shengli Road. The subproject will use Shenghua Thermal Power Plant as basic heat source and the existing coal-fired boiler of Dongyuan Thermal Company will be gradually outdated, and two of the existing coal-fired boilers will be upgraded to two monomer 70MW gas boilers as peak load heat source.

3.2 Construction Details

See **Table 3-2** for overview of the contents of each subproject.

Table 3–2 Overview of Each Subproject

	Chengde Subproject	Pingshan Subproject	Xingtai Subproject	Zhangjiakou Subproject
Project Name	Chengde Municipality District Heating Energy-saving Renovation Subproject	Pingshan County urban central heating energy saving facilities renovation and expansion project	Xingtai City, using industrial waste heat to focus heating project	District Heating and Supporting Facility of Affordable Housing Subproject in Qiaodong District, Zhangjiakou
PIU	Chengde Heating Group Co., Ltd.	Pingshan County Heating Company, Ltd.	Xingtai RISUN Anneng Heating Co., Ltd.	Zhangjiakou Dongyuan Heating Co., Ltd.
Construction Nature	Renovation and Expansion	Renovation and Expansion	New Construction	New Construction
Project Investment Cost	Total investment cost is CNY 219.56 million, applying for World Bank loan of $20 million.	Total investment cost is CNY154.88 million, applying for World Bank loan of $12 million.	Total investment cost is CNY696.28 million, applying for World Bank loan of $33.5 million. Among them, the investment cost of phase one is CNY351.3764 million which is self-financed by the	Total investment cost is CNY456.48million, applying for World Bank loan of $33.5 million.

	Chengde Subproject	Pingshan Subproject	Xingtai Subproject	Zhangjiakou Subproject
			enterprise; and the investment cost of phase two is CNY305.7418 million, World Bank loan will be applied for part of the investment.	
Project Location	Urban area of Chengde City	Urban area of Pingshan County	Urban area of Xingtai city and west village of Yanjiatun Town, Xingtai County (Heat source)	Urban area of Zhangjiakou City
Land use	The project does not involve land acquisition or building demolition, and will only involve temporary land occupation and permanent occupation of state-owned land of 12.29 acres.	The project does not involve land acquisition or building demolition, will only cover temporary land occupation.	The project does not involve land acquisition or building demolition, and will only cover temporary land occupation and permanent occupation of state-owned land.	The project does not involve land acquisition or building demolition, and will only cover temporary land occupation and permanent occupation of a small amount state-owned land.
Heat Source	Waste heat of Luanhe Power Plant cooling water (main heat source); Northeast suburb Heat Source Plant (for peak load).	Waste heat of Xibaipo Power Plant cooling water.	Waste heat of primary cooler cooling water and cooling water of coke dry quenching.	Water heat of Zhangjiakou Power Plant cooling water (main heat source); two gas-fired boilers of Dongyuan Thermal Power Company (for peak load).
Subproject Construction Content and Capacity	1) Construction of 4,764m long (trench length) DN400-DN80 primary heating pipelines, construction of 20 conventional heat exchange stations, construction of 114 building-level heat exchange station units and increase of heating area by 2,462,300m^2. 2) Reconstruction of 2743m long (trench length) DN500-DN80 primary heating pipelines, replacement or installation of 64 sets of DN1000 to DN250 hard-sealed welding butterfly valves, reconstruction of 56,792m long (trench length) secondary heating pipelines with a diameter of DN300 – DN50 and less, installation of 753 sets of DN80 to DN32 pressure difference balance valves. Upon the completion of the Subproject, the district heating area will increase by 2,462,300m^2.	1) Expansion of 4,011m long primary pipelines, construction of 2,272m long new primary pipelines and heat exchange station connection pipelines; upgrading and reconstruction of 3,193m long existing primary pipelines; 2) Construction of 36 heat exchange stations, capacity expansion and reconstruction of 5 existing heat exchange stations into 8 heat exchange stations; energy-saving upgrading and renovation of 46 old heat exchange stations. 3) Household-based heat metering renovation to existing buildings for 16,934 households (with a total area of 1,923,600m^2) and heat metering renovation to 108 institutions. 4) Construction of 1 No. automatic control and command center. Upon the completion of the Subproject, the district heating area will increase by 3,031,200m^2.	Phase 1: 1) 9700m long circulating water pipelines from primary cooler to primary exchange station; 2) 1000 m steam pipelines from China Coal RISUN to primary exchange station; 2000 m condensate pipelines; 3) one plate exchange system chamber, 1 comprehensive command building, one warehouse and repair workshop, and one garage, within primary station; 4) 24326 m primary heat pipelines; 5) 27 thermal stations. Phase 2: 1) 1900m long circulating water pipeline from CDQ waste heat boiler electricity station to the primary station in the plant area; 2) 550m long circulation water pipeline from o-phthalic anhydride facility to primary station; 3) 2000m steam pipeline from the plant area to the primary station; 4) two primary station heat pump rooms; 5) 27860m pipeline for urban primary network; 6) thermal	1) One 2,016m^2 pressure isolation heat exchange station (including the command center) involving a land occupation area of approximately 2.84mu.) 2) Construction of Level 0 and Level 1 high-temperature hot water pipelines with a trench length of 20.5km. 3) Construction and reconstruction of 58 heat exchange stations; construction of 17 building-level heat exchange stations； 4) Installation of heat meters for the existing 1,340 residential buildings； 5) Removal and reconstruction of 2 Nos. 64MW coal-fired boilers in Dongyuan Company Heat Source Plant into 2 Nos. 70MW gas-fired boilers. Upon the completion of the Subproject, the district heating area will increase by 3,880,000m^2.

	Chengde Subproject	Pingshan Subproject	Xingtai Subproject	Zhangjiakou Subproject
			stations: 117 stations, including 14 building thermal stations. Upon the completion of the Subproject, the district heating area will increase by 8,016,300m^2.	
Pipeline route, heat exchange substation layout	See more details in Figure 2-1	See more details in Figure 2-2	See more details in Figure 2-3	See more details in Figure 2-4
Construction Period	3 years	4 years	5 years	3 years
Project implementation plan	The preparatory work for the project feasibility study, environmental impact assessment, preliminary design, construction drawing design, part of the project bidding will be completed before March 2016; all of the construction contents will be completed during year 2016 to 2017	The preparatory work for the approval of project proposal, feasibility study report, environmental impact assessment, preliminary design, construction drawing design, part of the project bidding will be completed before March 2016; all of the construction contents will be completed during April 2016 to October 2019	The preparatory work for a period of approval of project proposals, feasibility study report, environmental impact assessment, preliminary design, construction drawing design, part of the project bidding will be completed Before July 2015; the construction of phase one project will be complete before December 2015, and construction contents of phase two project will be completed in 2019.	The preparatory work for the approval of project proposal, feasibility study report, environmental impact assessment, preliminary design, construction drawing design, part of the project bidding will be completed before August 2015;all of the contents of the construction project will be completed before December 2017

3.3 Construction Method

Each of the subprojects includes pipeline construction, heat exchange substation construction, and installation of heat metering device. In addition, Xingtai subproject involves construction of primary heating substation and associated pipelines, Zhangjiakou subproject involves construction of pressure isolation heat exchange substation and renovation of coal-fired boilers to gas-fired boilers. Process of pipeline network, heat exchange substation construction, and heat metering device installation and possible pollutant emissions are stated in details as below.

3.3.1 Pipeline Network Construction

Open Excavation. Construction activities include trench excavation along existing road, pipe laying, group welding, pressure testing, backfill, and re-pavement (asphalt smoke emission will occur for asphalt pavement). Construction activities will generate noise and possible pollutant discharge. See **Figure 3-1**.

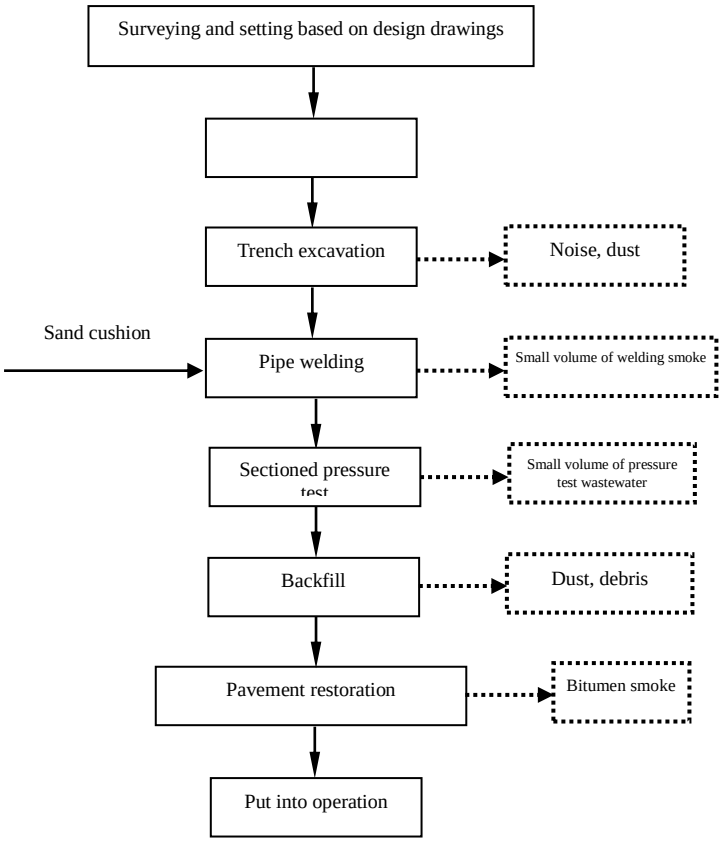


Figure 3–1 Construction Process of Pipelines and Pollutant Emission

Overhead Construction. Overhead construction can be used for steam pipeline network and condensation water pipeline network, the process of which are as follows: line positioning, pouring concrete support base, overhead pipeline laying, fixation installation, pipeline inspection, and hydraulic test. Among them, there is welding gas emission in the welding procedure. Excavation is needed in implementation of the support base; backfill will be done once pipeline installation is finished to restore construction site. Excavation and backfill will generate dust suspension and waste soil, and noise will occur throughout construction activities.

Pipe Jacking. Pipe jacking construction method could be used in laying the network crossing railway and highway, the process mainly includes: preparation, deployment of the operating pit, steel pipe jacking, backfill of operation pit, and surface restoration. Construction activities will generate suspended dust, noise and waste soil.

3.3.2 Heat Exchange Substation

Either conventional heat exchange substation or building-level heat exchange substation includes installation and commissioning of heat exchange equipment and soft water production system. New construction and renovation of heat exchange substation mainly include design, construction of new heat exchange substation or renovation of existing building internal structure, equipment installation and commissioning and operation. Construction activities will generate suspended dust, waste soil and noise. See **Figure 3-2** for details.

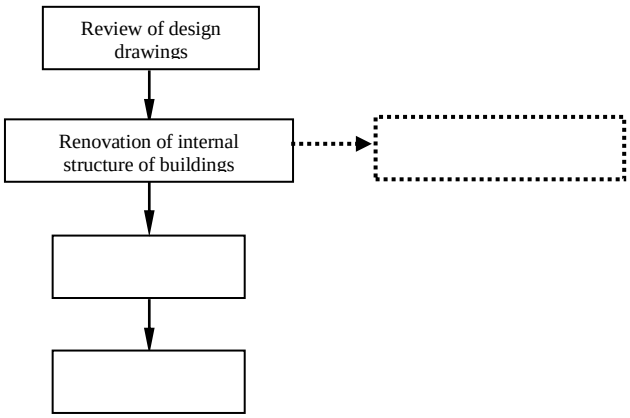


Figure 3–1 Construction Process of Heat Exchange Station and Pollutant Emission

3.3.3 Installation of Heat Metering Device

Installation of heat metering device: the process of installation of heat metering device is relatively simple and fast, and generally is direct installation based on the design.

4. Description of the Environment

4.1 Natural Condition

Hebei Province, abbreviated as Ji, is named after the fact that it is located north of the Yellow River. Hebei Province is located in the northern part of North China Plain with a total area of 190,000 km^2 and a total population of about 74 million. The major ethnic groups are Han, Man, Hui and Mongolian and ethnic minority population accounts for about 4% of its total population. Neighboring Inner Mongolia Autonomous Region and Henan Province respectively on the north and south and facing Bohai Sea on the east, Hebei Province joins Shanxi Province across Taihang Mountain and borders on the provinces of Liaoning and Shandong respectively on the northeast and southeast. The highest peak of the Province is 2882m high above the sea while the plain areas mostly have an elevation of 100m or less. Hebei Province is higher in the northwestern part where mountains, hills and plateaus are separated by basins and valleys and lower in the middle and southeastern parts comprising vast plains. With a coastline of 487km, Hebei Province belongs to the temperate continental monsoon climate featuring in distinct seasons in most parts of the Province. Due to different latitude and terrains, the annual sunshine time ranges from 2400 hours to 3100 hours and the annual frost-free period lasts 120 days to 200 days, with the annual average precipitation and the annual average air temperature respectively ranging from 300mm to 800mm and 4 ^oC and 13 ^oC.

The four subproject cities (counties) are located in northeast of Hebei Province (Chengde), Northwest (Zhangjiakou), Southwest (Pingshan County) and southern (Xingtai). Natural condition of the four cities (counties) is shown in **Table 4-1**.

Table 4–1 Natural Environment of the Subproject Cities (Counties)

1) Geographic Location			
Chengde City	**Pingshan County**	**Xingtai City**	**Zhangjiakou City**
Chengde city is located in the northeast of Hebei Province approximately 250km away from Beijing at 117°43′ ~ 118°04′east longitude and 40°51′ ~ 41°12′ north latitude. Boasting of its extreme convenience of transportation, Chengde is the intersection of Beijing-Chengde Railway, Jinzhou-Chengde Railway and Chengde-Longhua Railway and is connected to Beijing, Tianjin, Shenyang and Chifeng via trunk highways. Chengde is the transition area and also a traffic artery from North China Economic Belt to Northeast China Economic Belt. The subproject construction area is the main urban area of Chengde city (Shuangqiao District)	Pingshan County is located in the southwest of Hebei Province on the eastern foot of Mid Taihang Mountain at 113°31'-114°15' east longitude and 38°09'-38°45'north latitude. Pingshan County has Luquan City and Jingxing County as its neighbors respectively to the east and south and borders Wutai County and Yuxian County of Shanxi Province to the west. On the north, Pingshan County is connected with Fuping County and Lingshou County. The County as a whole has a total area of 2,648km^2. The subproject construction area is located in urban area of Pingshan county	Xingtai city is located in the central south of Hebei Province on the eastern foot of Taihang Mountain at 113°45'-114°38' east longitude and 37°58'-37°22' north latitude. Xingtai City has Renxian County and Nanhe County and Shahe City as its neighbors respectively to the east and south and borders Zuoquan County, Heshun County and Xiyang County of Shanxi Province to the west across Taihang Mountain. On the north, Xingtai City is connected with Neiqiu County that surrounds the east, west and northern sides of Xingtai City. The City is 77.1km wide east-west and 38km long south-north and has a total area of 1,983km^2. The subproject construction area is located in the urban center (Qiaodong District and Qiaoxi District) of Xingtai City and also the territory of Xingtai County.	Zhangjiakou city is located in the northwest of Hebei Province at 113°50′~116°30′ east longitude and 39°30′~42°10′ north latitude on the border of Beijing, Shanxi and Inner Mongolia. Leaning on Chengde on the east and bordering Beijing on the southeast, Zhangjiakou City is the neighbor of Baoding City to its south and borders Shanxi Province on its west and southwest and Inner Mongolia on its north and northwest. 289.2km long south to north and 16.2km wide east to west, the City as a whole has a total area of 36,800km^2. The subproject construction area is in the main urban area of Zhangjiakou city (Qiaodong District)
2) Geological Geomorphology			
Chengde City	**Pingshan County**	**Xingtai City**	**Zhangjiakou City**
Chengde city is at Beishan area of Hebei Province, in the Yanshan	Pingshan County is located in North China Natural Area and to the north	Xingtai City is with complex terrain, and is high in west and low in East,	Zhangjiakou city is in the transitional zone between the

subsidence zone and Inner Mongolia Plateau transition zone. Chengde's elevation ranges from 200m to 1800m that is higher on the northwestern and lower on the southeastern, with the northwestern part the Inner Mongolia Plateau, the southeastern Qilaotushan Mountains and the middle and southern Yanshan Mountains. A mountainous territory, Chengde has totally 8,803 mountains. Under the effect of multiple geological processes such as differential weathering, dynamic collapse, erosion and melting, a unique Danxia landform is formed on the basis of the bedrock that is complicated and diversified in lithologic terms. Shuangqiao District is located on the northeastern edge of the Yanshan Mountain where the exposed stratum comprises of granitic gneiss of the Achaean Group, the effusive rock and volcanic sedimentary rock of the Cenozoic and Mesozoic Groups and the alluvial and diluvial and residual slope deposits of the Quaternary System. The elevation falls in the range of 320m to 350m.	and east of Taihang Mountain uplift zone of the Neocathaysian Tectonic System and is a structural system formed 45 million years ago comprising of two uplifts and two depressions. The County as a whole is higher on the west, south and north and lower on the east and in the middle. Nantuo, the highest peak in the territory, has an elevation of 2281m and the County, from west to east, comprises of the mid-mountain area, the low-mountain area and the low hill area. With an altitude of 1000 ~ 1700m, the mid-mountain area has a relative elevation difference of 300 ~ 600m and belongs to the erosion structure. The mountain slopes have a gradient of more than 45° and are partially steep with deep cut V-shaped valleys. The low-mountain area has an altitude of 500 to 1000m, with round peaks and placid slopes with a gradient of 25 to 45° with relatively shallow-cut valleys. The low-hill area is mainly distributed in the eastern part and the river valley area with an altitude of below 500m.	high in South and low in north. With a west-to-east slope gradient of 3 to 5‰, Xingtai City can be divided into three parts in terms of landform, namely, the mountainous area, the low-hill area and the plain area. Located in the western part of Xingtai City, the mountainous area has an average elevation of around 600m with layer upon layer of peaks rising one higher than the other and the highest peak is Shiziyiliang Peak with an elevation of around 1,822m. Located in the middle part with an average elevation of around 200m, the low-hill area is represented by the waving hills and numerous grooves as a transition zone from the low-to-medium height hills to the plain area. In the eastern part of Xingtai City is the piedmont alluvial plain advantageous in its flat terrain and fertile soil with an average elevation of 70m and a minimum elevation of 42.8m. The subproject is located in the eastern plain area of Xingtai County, with altitude of 63 ~ 64m and is flat open.	plateau of Mongolia and the North China Plain. As a part of the intermountain basin in the northwestern part of Hebei Province, It is high on the northwest and low on the southeast with a surface elevation of 670m ~ 800m and a mountain altitude of 1900m. With 2/3 of the territory occupied by mountains and low hills, the City as a whole has the other 1/3 being small plains and rivers. The northern part is the Mongolian Plateau surrounded by Yinshan Mountains while the southern part is a horseshoe-shaped area comprising of the mountains of Beiling Mountain and Taihang Mountain and Chai-Zhang-Xuan Basin belonging to Yanghe River Basin. Qiaodong District is located in the eastern half of Zhangjiakou City. Being a fish-shaped irregular landform that is long from south to north and narrow from east to west, Qiaodong District inclines from northeast to southwest. The west half of the District belongs to the Grade I and II alluvial terrace of Daqinghe River and the east half belongs to the gentle-slope accumulation landform of Yanshan Mountain. The surface slop is relatively large of up to 3% to 4%, and the elevation ranges from 560m to 800m above sea level.

3) Engineering Geology

Chengde City	Pingshan County	Xingtai City	Zhangjiakou City
Located in a part of North China Earthquake Zone with a relatively low level of seismic activity, Chengde City has not experienced any strong earthquake in history and the level of small and medium-sized seismic activities has remained quite low since 1970. The 1720 earthquake in the west part of Beijing is the earliest earthquake in record in which Chengde has experienced seismic damages while the 1976 Tangshan Earthquake is the one in record with the most serious damages, but its maximum impact intensity was less than Grade 6. The ground	Pingshan County is located to the north and east of Taihang Mountain uplift zone of the Neocathaysian Tectonic System in the eastern part of North China and on the transition zone from Fuping Uplift to Jingxing Depression. With a complicated terrain that is high on the west and low on the east, Pingshan County has an elevation ranging from 120m to 2,281m and a relative elevation difference of 2,161m. Approximately 70% of the County is covered by low mountains, hills and river valleys and 40% of the land area has a gradient of less than 25^0. Due to the sparse vegetation and thin soil stratum, the	The shallow soil strata in Xingtai City comprise of the following layers from top to bottom: Layer 1, approximately 0.5m thick, mainly comprises of clayey soil and sandy soil; Layer 2, approximately 4.7m thick, is mainly silty clay; Layer 3, approximately 2.3m thick, is mainly fine sand with good stability of distribution; Layer 4, which is approximately 10.5m thick, is mainly coarse sand with poor stability of distribution; Layer 5, approximately 9.0m thick, is mainly clay soil with a bottom depth of 18.0m to 27.0m; Layer 6 is mainly sand and gravels unevenly distributed with a	Most parts of Zhangjiakou City are covered with light loam or collapsed loess with a ground endurance of 10 to 20ton/m^2, with some local parts covered with sand and gravels with a ground endurance of 25 to 40 ton/m^2. Zhangjiakou City is located at the junction between Shanxi Graben Basin and Beijing-Bohai Fault Zone. As it enters the third activity period of Shanxi Seismic Zone and the fourth activity period of North China Seismic Zone, Zhangjiakou City becomes one of the key seismic fortification cities. Its ground motion peak acceleration is 0.10g and the design seismic

motion peak acceleration of Chengde City is 0.05g while the seismic fortification intensity is Grade 6.	County has 68.6% of its land area affected by soil erosion. Approximately 88% of the land area is covered by brown soil. The other soil types mainly include brown earth, meadow soil and subalpine meadow soil. The parent soil mainly comprises of granite and gneiss, in addition to minor limestone and shale. The ground motion peak acceleration in Pingshan County is 0.10g and the seismic fortification intensity is Grade 7.	thickness of 16.60m and a bottom depth of 27.0m to 43.6m; Layer 7, with a thickness of approximately 4.4m, is mainly clay soil. Xingtai City is located on the east side of Taihang Mountain Uplift and there are two faults nearby its urban center from activities of the Cenozoic Era. Its ground motion peak acceleration is 0.10g and the design seismic fortification intensity is Grade 7.	fortification intensity is Grade 7.
4) Hydrology			
Chengde City	**Pingshan County**	**Xingtai City**	**Zhangjiakou City**
Chengde City belongs to high mountain hydrological sub region. The loose pore water-bearing rock group is the key water-bearing rock group with value of exploitation in the region. Ground water replenishing mainly relies on river water, with little replenishing from precipitation and lateral replenishing. The flow direction is substantially consistent with that of surface rivers. Runoff discharge and artificial exploitation are the key approaches of discharge of ground water. The groundwater table usually has a depth of 5m to 30m under the ground and is relatively shallower in river valleys.	The riverbed in the mountains of Pingshan County has a relatively deep cut, with steep gradients and small groundwater reserves. Atmospheric precipitation infiltration is the key source of ground water replenishing in mountainous areas, followed by lateral replenishing of aquifer at the upstream river sections. Runoff discharge and artificial exploitation are the key approaches of discharge of ground water. The ground water table usually has a depth of more than 4m under the ground.	The aquifer region in Xingtai County mainly comprises of the Quaternary pore water in loose rock aquifer, with extremely poor water yield property in the aquifer that ranges from 35 to 50m in terms of total thickness. Ground water replenishing mainly relies on piedmont lateral runoff replenishing and precipitation infiltration has a small replenishing capacity. Ground water discharge is mainly artificial exploitation and the ground water table usually has a depth of more than 20m under the ground.	The urban area of Zhangjiakou City has the typical characteristics of an intermountain basin below the plateau where an underground aquifer of belt-like alluvial plain and alluvial river valley plain is formed. Ground water replenishing mainly relies on infiltration of atmospheric precipitation along the fractures, surface water runoff and flood infiltration. Runoff discharge and artificial exploitation are the key discharge approach of ground water. The ground water table has a depth of 60 to 150m under the ground.
5) Meteorology			
Chengde City	**Pingshan County**	**Xingtai City**	**Zhangjiakou City**
Located in the transition zone from cold temperate zone to the warm temperate zone, Chengde city belongs to a semi-arid and semi-humid, and intercontinental monsoon mountain climate, with annual average temperature of 9 degrees. Featuring in distinct difference in terms of local climate, such climate has four distinct seasons. With an annual average precipitation of 560mm, most of the precipitation is concentrated in the flood season of July to August, accounting for 53% of annual precipitation. The annual average evaporation is 1,493.2mm while the perennial average wind speed is 1.2m/s and the annual maximum wind speed is 17m/s. with an	Pingshan County belongs to the warm temperate and semi humid continental monsoon climate, featuring in distinct four seasons, strong seasonable characteristics, adequate sunshine, small precipitation and hot summers and cold winters with large temperature difference. With an annual average temperature of 12.7 degrees, the hottest month in a year is July with an average temperature of 26.3℃ while the coldest month is January with an average temperature of -8.2 ℃ . The annual total solar radiation ranges from 131 to 136 kCal /cm2 and the annual frost-free period is 140 to 180 days.	Xingtai city belongs to warm temperate semi-arid monsoon climate area. The continental monsoon climate has outstanding characteristics, including adequate sunshine, simultaneous occurrence of rainfall and heat in the same season and district four seasons. Over the last 5 years, the average wind speed is 2.5m/s and the maximum wind speed is 24m/s. The multi-year average temperature of 14.6 degrees, with annual extreme maximum temperature of 42.8 degrees and annual extreme minimum temperature of minus 17.6 degrees. The annual average precipitation is 516.8mm and the daily average precipitation is 133.3mm. The annual average	Zhangjiakou city belongs to temperate continental monsoon climate, with distinct four seasons, windy year-long and large temperature difference. The annual average dominant wind direction is west or northwest and the annual average wind speed is 2.5m/s and the number of windy days in a year amounts to around 57.2 days. With an annual average precipitation of 403.6mm, most of the precipitation is concentrated in the flood season of June to August. The annual average evaporation is 1700mm. The average temperature is 8.8℃. The hottest month is July with an average temperature of 23 to 7℃ while the coldest month is January with an average

annual frost-free period of 126 to 202 days, the max. Frozen earth depth is 126cm. The annual average relative humidity is 59% while the annual sunshine time is 2444 to 3089 hours.		relative humidity id 67% while the annual total hours of sunshine is approximately 2421 hours.	temperature of -8.3℃. The annual frost-free period is 120 to 150 days, the max. The annual sunshine time is 2821.6 hours.
6) Soil			
Chengde City	**Pingshan County**	**Xingtai City**	**Zhangjiakou City**
Belonging to 4 soil groups and 28 sub-groups, the soil mainly comprises of brown forest soil and brown earth, accounting for more than 80% of the land area of the City as a whole. With excellent structure, such soil has rich contents of nutrition and moderate pH value. In terms of vegetation zoning, Chengde City belongs to a sub-zone of the humid temperate semi-arid deciduous forest, broad-leaved forest and shrub steppe.	With diversified soil types, there are 4 soil groups, 11 sub-groups, 37 soil genus and 98.4 soil species. The sub-alpine meadow soil is mainly distributed on the mountain ridges with an elevation of 1900m or more in an area accounting for 0.1% of land area of the County as a whole. The brown forest soil is mainly distributed in the remote mountains in the northwestern part with an elevation of 1000 to 1300m and taking a percentage of around 8.1%; the brown earth is mainly distributed in the low hill highlands with an elevation of less than 800m, taking a percentage of 88.8%. The meadow soil is distributed on the river terraces with an elevation of around 200m, taking a percentage of around 3%. The arable land is divided into paddy fields and dry land. The County as a whole has an effectively irrigated land area of 25,300 ha and drought and flood irrigation land of 16,700 ha.	There are 4 soil groups, 12 sub-groups, 41 soil genus and 105 soil species. The 4 soil groups are: brown forest soil with an area of 260,718.9mu mostly distributed in the remote mountains, brown earth with an area of 2,541,341.6mu and taking a percentage of 88.4%, mostly distributed the western mountainous area with an elevation of less than 1000m, the low-hill area and some parts east of Jing-Guang Railway, calcareous soil with an area of 49,308.4 mu and a percentage of 1.8%, mostly distributed on the plains east of Jing-Guang Railway, and meadow soil with an area of 25,631.1mu and taking a percentage of 0.9%, mostly distributed in the intermountain valleys.	In the southern part of Zhangjiakou City is the alluvial and diluvial plain of Yanghe Basin where the soil is Castanozem with large layer thickness and high content of organic matters; soil in the northern mountainous area mainly comprises of sandy soil with thin layers and low fertility. Located on the transition zone from brown earth to castanozem, soil group profile in Qiaodong District is not typical, roughly including the eastern hillside land mostly distributed with castanozem, the southwestern part with relatively wide distribution of light castanozem and the western flood plain and pluvial depression distributed with meadow soil.
7) Acoustic Environment			
Chengde City	**Pingshan County**	**Xingtai City**	**Zhangjiakou City**
It is known from the results of acoustic environment quality noise monitoring conducted by the environmental protection and monitoring bodies in Chengde that the acoustic environment quality of the subproject construction region can meet the noise control requirements of the Standard of the Acoustic Environment Quality (GB3096-2008).	It is known from the noise monitoring results provided by the IA of Pingshan Subproject that the urban acoustic environment is of good quality in Pingshan and the acoustic environment quality of the subproject construction region can meet the noise control requirements of the Standards of the Acoustic Environment Quality (GB3096-2008).	It is known from the results of acoustic environment quality noise monitoring conducted by the environmental protection and monitoring bodies in Xingtai that the acoustic environment quality of Xingtai county is good; the acoustic environment quality of the subproject construction region can meet the noise control requirement of the Standard of the Acoustic Environment Quality (GB3096-2008).	It is known from the results of local acoustic environment quality noise monitoring that the acoustic environmental quality of other objectives in the subproject construction area can meet the noise control requirement of the Standard of the Acoustic Environment Quality (GB3096-2008) except three monitoring sites in the construction area of the Subproject where the noise background exceeds the standard. The three sites with non-compliant monitoring results are: A. the office building of Qiaodong District Urban Construction Bureau and the residential areas in Zhangyuan New City where the nighttime

			environmental noise does not meet the standard affected by traffic noise; B. the residential community on Fu'an Street where both the daytime and nighttime environmental noises exceed the standard affected by noises of existing small boiler houses.

8) Air Environment

Chengde City	Pingshan County	Xingtai City	Zhangjiakou City
According to the air quality monitoring results in 2014 of the Urban Center of Chengde City, the air quality met and was better than Grade II standard in 249 days of the year, equivalent to a yearly compliance rate of 68.2%. The air quality met Grade I standard in 40 days. SO2, NO2 and CO, respectively with an annual average concentration of 40 micrograms/m3, 39micrograms/m3 and 2.3 milligrams/m3, satisfied Class II standard specified in the Ambient Air Quality Standard (GB3095-2012). The inhalable particular matters (PM10), fine particular matters (PM2.5) and ozone (O3), with an annual average concentration of 111 microgram /m3, 52 microgram/m3 and 167 microgram/m3, exceeded the requirements specified in the Ambient Air Quality Standard. The key causes of noncompliance of the air-borne particular matters (PM10 and PM2.5) and O3 include coal burning, construction dust, fume emission by catering sector, and motorized vehicle tail gas among other sources of pollution, which have the seasonal feature where the pollution is heavier in winter heating season and better in non-heating seasons.	The air quality monitoring results of the urban area of Pingshan County in 2014 show that the annual average concentrations of SO2 (0.74 microgram/m3), NO2 (0.055 microgram/m3), CO (1.716 milligram/m3), PM10 (0.219 microgram/m3) and PM2.5 (0.123 microgram/m3) and O3 (0.076 microgram/me) all meet Class 2 standard of Ambient Air Quality Standard (GB3095-2012).	According to the ambient air status monitoring conducted by Xingtai Municipal Environmental Protection Monitoring Station in the urban area of Xingtai and the site of heat source works of Xingtai RISUN Coal Chemical Industry Co., Ltd. (in Xingtai County), the 24-hour average concentrations of SO2 and NO2 in the monitoring area were respectively in the range of 18 – 84 microgram/m3 and 29 – 78 microgram/m3, satisfying Class 2 standard of Ambient Air Quality Standard (GB3095-2012). The annual average concentration of inhalable particular matters (PM10) ranges from 51 to 334 microgram/me, exceeding the requirements of Ambient Air Quality Standard. Such non-compliance of PM10 mainly occurs in winter because of the relatively heavy dust in winter when wind speed is low, unfavorable to dust dispersal.	According to the results of ambient air quality monitoring conducted by Zhangjiakou Municipal Environmental Protection and Monitoring Station in 2014 of the Urban Center of Zhangjiakou City, the air quality met and was better than Grade II standard in 315 days of the year, equivalent to a yearly compliance rate of 86.3%. The air quality met Grade I standard in 94 days. SO2, NO2 and CO, inhalable particular matters (PM10), fine particular matters (PM2.5) and ozone (O3), respectively with an annual average concentration of 0.054 micrograms/m3, 0.029 micrograms/m3 and 2.140 milligrams/m3, 0.079 micrograms/m3, 0.036 micrograms/m3 and 0.134 micrograms/m3, satisfied Class II standard specified in the Ambient Air Quality Standard (GB3095-2012).

9) Surface Water Environment

Chengde City	Pingshan County	Xingtai City	Zhangjiakou City
The major water body in the project area of Chengde Subproject is Wulie River. Flowing through the urban area downwards and into Luan River at Fengyingzi Town, Wulie River is one of the sources of drinking water in Chengde city.。 Wulie River has 4 main water	The main water bodies in Pingshan County are Hutuo River and Ye River. Results of monitoring conducted by Pingshan County Environmental Monitoring Station in 2014 over the water quality control sections of Hutuo River and Ye River show that the water quality control sections of	All the rivers in Xingtai city are seasonal rivers. Among the 11 key rivers, 9 accept domestic sewage and industrial wastewater, except the Yellow River-to-Tianjin Canal (Qingliang River) and Qili River, and there is no natural runoff. Monitoring results show that 10	The main water body in the urban area of Zhangjiakou City is Qingshui River, a heavily silted and perennial river. Qingshui River has two key water quality control sections. Results of monitoring provided by Zhangjiakou Municipal Environmental Protection Bureau

quality control sections. According to the monitoring results for Year 2014 provided by Chengde Municipal Environmental Protection Bureau, three of the four water quality control sections meet Class III water quality standard and the other one meets Class II water quality standard specified in the Surface Water Environment Quality Standard (GB3838- 2002). The water quality of Wulie River is generally good.	both rivers meet Class III water quality standards specified in the Surface Water Environment Quality Standard (GB3838-2002) as well as Class III water quality standards for water function zone planning, meaning that Hutuo River and Ye River are generally good in terms of water quality.	rivers are worse than Class V standard specified in the Surface Water Environment Quality Standard (GB3838-2002) and unable to meet the requirement of water function planning. Qili River, the only exception meets Class III water quality standard. These rivers arranged in the descending order of pollution degree are namely Wangyang River, Fuyang New River, Fuyang Drainage River, Fuyang River, Weizhai River, Niuwei River, Xiaohuang River, Weiyun River, Laozhang River and Yellow River-to-Tianjin Canal (Qingliang River). The key pollutants include COD, ammonia nitrogen and TP.	show that both water quality control sections meet or are higher than Class IV water quality standards specified in the Surface Water Environment Quality Standard (GB3838-2002) as well as Class V water quality standards for water function zone planning, meaning that Qingshui River is generally good in terms of water quality.

10) Ground Water Environment

Chengde City	Pingshan County	Xingtai City	Zhangjiakou City
Ground water monitoring results of the urban center of Chengde City for Year 2013 to 2014 provided by Chengde Municipal Environment Monitoring Center show that the ground water quality at the various monitoring sites in the urban center meet the requirements of the standard and no non-compliance was identified.	Based on the ground water monitoring conducted in 2014 at 2 monitoring sites around the county town of Pingshan County, all 12 monitored indicators satisfy Class III water quality standards specified in the Ground Water Quality Standards (GB/T14848-93) and no substantial changes were noticed of both monitoring results, indicating that the ground water quality is generally good.	Based on the ground water monitoring conducted in 2014 by Xingtai Municipal Environment Protection and Monitoring Station at 7 monitoring sites in the subproject area, all the monitored indicators satisfy Class III water quality standards specified in the Ground Water Quality Standards (GB/T14848-93), indicating that the ground water quality is generally good.	Based on the ground water monitoring provided by Zhangjiakou Municipal Environment Protection Bureau for the urban center of Zhangjiakou City, all the monitored indicators satisfy Class III water quality standards specified in the Ground Water Quality Standards (GB/T14848-93), indicating that the ground water quality is generally good. The monitoring results also show that the key pollutants of ground water in the urban center of Zhangjiakou City are nitrate nitrogen and fluoride.

11) Ecological Environment

Chengde City	Pingshan County	Xingtai City	Zhangjiakou City
The key types of ecosystems in Chengde City include forests, steppe, wetland, farmland and urban ecosystem. However, the ecological environment is relatively vulnerable and sensitive and has relatively weak environment load-carrying capacity. Belonging to the urban ecological function zone, Chengde City has no natural forests in its territory and the vegetation is mostly artificial vegetation. There are no nature reserves or rare and endangered wild animals and plants within and around the urban area of Chengde City.	Pingshan County is located in the West Mountain Eco-city Belt of Shijiazhuang City. In such a background, Pingshan County is divided into three Class I eco-function zones and six Class II eco-function zones according to Pingshan County Eco-county Construction Planning. The county town of Pingshan County is located in the constructed urban ecosystem zone specified in the Planning. There are no nature reserves or rare and endangered wild animals and plants within and around the urban area of Pingshan County.	Belonging to the urban ecological function zone, Xingtai City has no natural forests in its territory and the vegetation is mostly artificial vegetation, mainly including the roadside artificial vegetation. There are no nature reserves and rare or endangered wild animals and plants within and around the urban area of Xingtai City.	The key types of ecosystems in Zhangjiakou City include forests, steppe, wetland, farmland and urban ecosystem. Natural vegetation in Qiaodong District include reeds, thorns and seabuckthorn. Key tree species include pines, cypress, poplar, willows, elms and locust trees. There are some small wild animals and birds in the low hills and mountains in the east. There are no natural reserves or rare and endangered wild animals and plants within or around the urban area.

4.2 Overview of Social Environment

Located in different regions of Hebei Province, the four subproject cities/counties are different, but not very largely different, in terms of social and economic development. Here described in **Table 4-2** as follows is the overview of social environment in the four subproject cities / counties.

Table 4-2 Overview of Social Environment in the Subproject Cities / Counties

1) Administrative Region and Population			
Chengde City	**Pingshan County**	**Xingtai City**	**Zhangjiakou City**
Chengde City administers 3 city districts of Shuangqiao District, Shuangluan District and Yingshouyingzi Mine District, 5 counties of Chengde County, Xinglong County, Pingquan County, Luanping County and Longhua County and 3 autonomous counties of Fengning Man Autonomous County, Kuancheng Man Autonomous County and Weichang Man and Mongolian Autonomous County. Chengde City administers 153 township governments, 80 town governments, 10 street offices, 163 community resident committees and 2,516 villager committees. The City as a whole has a total area of 39,513km^2, including 708km^2 for the urban center. At the end of 2012, the population of Chengde city was 3,769,200, including 587,800 for the city districts and 3,181,400 for the counties. Based on a preliminary statistics, the implementation area of the Subproject involves a total population of 214,400 persons, accounting for approximately 58% of Shuangqiao District, which is the subproject area and the old urban area of the key areas of Chengde City.	Administered by Shijiazhuang City, Pingshan County consists of 12 towns and 11 townships, namely, Pingshan Town, Donghuishe Town, Wentang Town, Guyue Town, Nandian Town, Gangnan Town, Xiahuai Town, Mengjiazhuang Town, Jiaotanzhuang Town, Xiaojue Town, Xibaipo Town and Xiakou Town and Dongwangpo Township, Lianghe Township, Xidawu Township, Shangsanji Township, Zhaibei Township, Beiye Township, Sujiazhuang Township, Shangguanyintang Township, Yangjiaqiao Township, Yingli Township and Hehekou Township. The County has 717 administrative villages and a total population of 468,000 at the end of 2013, including an agricultural population of 433,447 person and a non-agricultural population of 34,396 persons. There are 460,000 mu arable land, 460,000 water area and 2,930,000 mu mountainous land. Pingshan County Government is located in Pingshan Town, which is the county town, in the southeastern part of the County. The Subproject construction area is located in the county town.	Xingtai City administers 2 city districts, 2 management zones, 2 county-level cities, 15 counties, namely, Qiaodong District, and Qiaoxi District, Xingtai Economic Development Zone and Dacaozhuang Management Zone and Xingtai County, Lincheng County, Neiqiu County, Baixiang County, Longyao County, Ren County, Nanhe County, Ningjin County, Julu County, Xinhe County, Guangzong County, Pingxiang County, Wei County, Qinghe County and Linxi County and the county-level cities of Nangong and Shahe. Qiaodong District and Qiaoxi District constitute the urban center of Xingtai City. The City as a whole had a total population of approximately 7,188,600 at the end of 2013, including 1,090,000 persons for the 2 city districts and 2 management zones and approximately 880,000 for the 2 county-level cities. The City as a whole has a total area of 12,486 km2, including 133 km2 for the urban area. The Subproject is located in the urban center of Xingtai City and Xingtai County involving a total population of approximately 1,130,000 and a total area of 2116km^2.	Zhangjiakou City administers 4 districts of Qiaodong, Qiaoxi, Xuanhua and Xiahuayuan, 13 counties of Xuanhua, Zhangbei, Kangbao, Guyuan, Shangyi, Yuxian, Yangyuan, Huaian, Wanquan, Huailai, Zhuolu, Chicheng and Chongli and 2 management zones of Chabei and Saibei and 1 hi-tech zone. At the end of 2013, the City as a whole had a registered population of 4,670,200, including an agricultural population of 3,100,700 and a non-agricultural population of 1,564,700 and female population of 2,264,700. The City as a whole has 2 ethnic minority townships and 91 ethnic minority villages. Qiaodong District, where the Subproject is located, administers 5 street offices and 2 administrative villages. At the end of 2013, the District as a whole had a registered population of 218,000, including a non-agricultural population of 201,000, a female population of 109,200 and an ethnic minority population of 10,064. By September 2014, the District had had a residential population of 10,275 persons enjoying the minimum living guarantee. The Subproject implementation area has a population of 117,414, including 59,311 women.
2) Regional Economy			
Chengde City	**Pingshan County**	**Xingtai City**	**Zhangjiakou City**
In 2013, Chengde City as a whole achieved a GDP of CNY127.209 billion, representing a growth by 9.3% than the previous year, 1.6 per cent higher than the national average growth and 1.1 percent higher than the provincial growth rate, and ranking second in the cities of the province。The primary industry achieved a growth of CNY	In 2013, Pingshan County achieved a GDP of CNY20.52 billion, and a fixed asset investment of CNY 12.54 billion, respectively up by 4.1% and 23.3% than the previous year. The total fiscal revenue accomplished in the year amounted to CNY1.836 billion while the whole society consumable retail sales volume accomplished amounted to CNY 3.87	In 2013, Xingtai City achieved a GDP of CNY 160.46 billion, up by 7.4% than the previous year. The primary, secondary and tertiary industries achieved a growth of CNY 26.56 billion, 84.61 billion and 49.29 billion, respectively up by 3.0%, 8.2% and 7.7%. The GDP per capita of Xingtai City amounted to CNY 22,277, up by CNY 916 or 6.9% than	In 2013, total GDP achieved in Zhangjiakou city is CNY131.7 billion, up by 8.0% than the previous year. The primary, secondary and tertiary industries achieved a growth of CNY 24.121 billion, CNY 55.483 billion and 52.096 billion, up by 6.2%, 9.0% and 7.4% respectively than the previous year. Amounting to CNY 29,907, the GDP per capita is lower

21.381 billion, up by 6.2% than the previous year; the secondary industry achieved a growth of CNY 65.004 billion, up by 10.5%; and the tertiary industry achieved a growth of CNY 40.825 billion, up by 8.8%, respectively 0.5 per cent and 0.4 percent higher than the national and provincial average and ranking the fourth in the province. In 2013, Chengde City achieved a financial revenue of CNY 19.20 billion, up by 9.4% than the previous year.	billion, up by 16.9% than the previous year; in the same year, the County's urban resident disposal revenue per capita reached CNY 19,678, up by 12.1% than the previous year and the farmers net income per capita reached CNY 4,714, up by13.1% than the previous year. Pingshan County is one of the integrated development pilot mountain counties determined by the State Council. The key industries include building materials, metallurgy, ceramics, chemical industry, light textile, machinery, etc. Pingshan County is a production base of wheat, rice, corn, cotton and peanuts.	the previous year. The tertiary industry structure was adjusted from 15.7: 54.1 :30.2 in the previous year to 16.6 : 52.7 : 30.7. The primary, secondary and tertiary industries achieved an economic growth contribution rate of 5.7%, 64.2% and 30.1%, respectively contributing to 0.4, 4.7 and 2.3 per cent of economic growth. In 2013, Xingtai City achieved fiscal revenue of CNY 16.71 billion.	than the provincial average. For the full year, the whole society fixed asset investment achieved amounted to CNY 129.298 billion, up by 9.2% than the previous year. The city's financial revenue achieved is CNY22.476 billion.。 In 2013, Qiaodong District as a whole achieved a GDP of CNY 14.68 billion, including CNY 5.93 billion achieved by the tertiary industry. The district achieved fiscal revenue of CNY 11.23 billion.

3)Physical Cultural Resources

Chengde City	Pingshan County	Xingtai City	Zhangjiakou City
Chengde Summer Resort and the Eight Outer Temples located in the urban center of Chengde City is a national key cultural relics protection unit and was included into the World Cultural Heritage Catalogue by UNESCO in 1994. It has been verified during the site investigation that the scope of impacts from the construction activities of Chengde Subproject are very far away from Chengde Summer Resort and is located more than 200m away from Puning Temple, one of the Eight Outer Temples with the closest distance from the Subproject. Thus, construction of the Subproject will produce no impacts. Figure 4-1 shows in detail the location relationship between the components of Chengde Subproject and the cultural relics protection units. In addition, the scope of EIA and the scope of construction impacts of the Subproject involve no other cultural relics of all levels as well as cultural relics, ancient trees, geological remains and other physical and cultural resources.	It has been verified during the field investigation that Pingshan Subproject involves no cultural relics of all levels or other cultural relics, ancient trees, geological remains and other physical and cultural resources in its scope of EIA and construction impacts.	It has been verified during the field investigation that Xingtai Subproject involves no cultural relics of all levels or other cultural relics, ancient trees, geological remains and other physical and cultural resources in its scope of EIA and construction impacts.	It has been verified during the field investigation that Zhangjiakou Subproject involves no cultural relics of all levels or other cultural relics, ancient trees, geological remains and other physical and cultural resources in its scope of EIA and construction impacts.

4) Transportation

Chengde City	Pingshan County	Xingtai City	Zhangjiakou City
In Chengde, there are four railways,	Pingshan County has 7 highways	Xingtai City boasts of a developed	In Zhangjiakou City, 6 expressways

namely Jing-Cheng Railway, Jin-Cheng Railway, Jing-Tong Railway and Cheng-Long Railway, with a mainline length of 632km. In Chengde, there are National Highway No. 101, 111 and 112 and Beijing-Chengde Expressway. In addition, Chengde is building an integrated road network transportation system connecting the various districts and counties and the surrounding cities via expressways.	connecting with other provinces, including 4 national and provincial highways and 180 county and township arterial highways with 1639km in length. National Highway No. 207 and Pingshan-Shexian Highway run north to south through the County. Shuo-Huang Railway and Shi-Yan Highway are two major corridors crossing the whole territory of Pingshan County for transportation of coal out of Shanxi Province. Shuo-Huang Railway, in particular, has an 80km long section in Pingshan and 7 stations.	transportation system, with Jing-Guang Railway and Beijing-Hong Kong-Macau Expressway running south to north while Xing-He Highway, Xing-De Highway, Parallel Line of National Highway No. 107 and Xing-Lin Highway running through the City as well. Villages and towns are all connected by roads.	of Jing-Zhang, Xuan-Da, Dan-La, Zhang-Shi, Zhang-Cheng and Jing-Xin and 4 railways of Jing-Bao, Feng-Sha, Da-Qin and Sha-Yu have been built. Expressways opened to traffic have amounted to a total length of 825km and highways opened to traffic to 19,000km in the City. Transportation routes under construction include Zhang-Zhuo Expressway, Zhang-Shi Expressway Phase III, and Jing-Xin Expressway Phase II, Connecting line of Zhang-Shi Expressway and Zhang-Cheng Expressway and 7 branch railways.

5) Mineral Resources

Chengde City	Pingshan County	Xingtai City	Zhangjiakou City
Chengde City has rich reserves of mineral resources and has discovered 98 minerals, including 55 minerals with proven reserves, and 181 proven mine production places. The accumulative proven reserves of solid mineral amount to 3.5 billion tons and the total available reserves amount to 3 billion tons, representing an available reserve per capita of 838 tons.	Pingshan County has rich reserve of mineral resources and there are 51 types of preliminarily proven mineral deposits with reserve of 6 billion m3 distributed at more than 750 ore occurrences located in 119 villages. There are more than 20 developed and utilized mineral resources, most of which are distributed within 20km on both sides of Shuo-Huang Railway, including the only medium-sized bucholzite mine of Hebei Province with a reserves of 1,519,000 tons.	Xingtai City has relatively rich reserve of mineral resources. In addition to coal and iron, there are numerous types of non-metallic minerals. There are 28 known mineral resources and those with proven reserves include magnesite, dolomite, kyanite, cement limestone, garnet, dimension stone for building facing, etc.	Zhangjiakou City has relatively rich reserves of mineral resources and has discovered 97 types of minerals. There are 33 types of minerals with proven reserves, including energy minerals, ferrous metal, and non-ferrous metal, and noble metal, rare metal and chemical materials. There are 158 production places of proven minerals, including 23 large ones, 34 medium-sized and 101 small ones.

6) Tourism Resources

Chengde City	Pingshan County	Xingtai City	Zhangjiakou City
Chengde City has 9 national-level key cultural relics, 35 provincial-level key cultural relics and more than 500 municipal-level key cultural relics. With more than 1300 cultural relics and remains, Chengde City is one of the best tourism cities in China boasting of a great number of the "world-class" tourism resources, including the world's largest royal garden (Summer Resort), the world's largest royal temples (the Eight Outer Temples), the world's largest wooden Buddha (the Thousand-hand and Thousand-eye Kwan-yin at Puning Temple), the world's shortest river (the Hot River). In addition, Jinshanling Great Wall, Xinchui Peak and Nine Dragon Mountain are also located	Located on the eastern foot of the middle section of Taihang Mountain in the western part of Hebei Province, Pingshan County has the name of "Eight-mountains, One-water and One-field" and is the site of the famous relics of the Capital City and King's Tomb of Kingdom Zhongshan. At King Zhongshan No. 1 Tomb and No. 6 Tomb alone, more than 19,000 relics were unearthed. Since 1980's, the tourist resources of Pingshan County have been initially developed and Pingshan County become a destination of tourists and a place of recuperation mainly comprising of the famous and ancient sites of Xibaipo Revolutionary Site and Kingdom Zhongshan Relics and scenic sites of Tiangui Mountain and	In the territory of Xingtai City, there are tourist destinations of Lingxiao Mountain, Baiyun Mountain, Zijin Mountain, Yunmeng Mountain, Xingtai Great Canyon and Jiulong Valley. Xingtai Great Canyon is national geological park, a Class 4A scenic site located 65km away from the urban center of Xingtai at Hejiaping Village, Luluo Town in the southwestern part of Xingtai County.	Zhangjiakou City has 3 national-level natural reserves, 1 national-level forest park, 16 provincial-level forest parks and 1 provincial-level scenic spot. Chongli and Chicheng, the most advantageous and representative skiing sites in North China, have a winter snowfall of up to 1m and a snow deposit period of more than 150 days. Zhangbei and Guyuan, representative destinations of Bashang Plateau with flat terrains and vast steppe, are the ideal place of summer resort and steppe sightseeing for their cool summers with an average temperature of 18℃ and fresh air with a negative oxygen ion concentration of 3000 to 6000 per cm3.

in Chengde.	Nantuo Mountain as well as the place of recuperation of Wentang Mineral Spring Recuperation.		
7)District Heating			
Chengde City	**Pingshan County**	**Xingtai City**	**Zhangjiakou City**
Up till 2014, the district heating area in old city of Chengde city is 1225×104 m2, besides, there is unrealized district heating area with 8.7×104 m2 which is borne by regional independent small coal-fired boiler room. The existing primary heating pipelines in the urban area are 244.09km long with a maximum diameter of DN1000; the existing secondary heating pipelines are 487.19km long; the primary and secondary heating pipelines respectively have a water loss rate of 0.5% and 0.8%. There are 178 heat exchange stations, mostly unattended. The main heat source of district heating in Chengde City is State Grid Luanhe Power Plant with a heating capacity of 518MW. Chengde Northeast Suburb Heat Source Plant is a peak modulation heat source with a heating capacity of 2x58MW.	By the end of 2014, there is a total built area of 4,961 thousand m2 in Pingshan County, and the area connected to district heating network in urban area is 4,376 thousand m2, including 3,392,000m2 of residential buildings and 984,000m2 of public buildings. The heating penetration rate was 88.2% and the rest of the area is heated by electricity and small coal stove. The primary high-temperature trunk pipelines and secondary pipelines in the urban area are respectively 30.3km and 69.9km long. Totally 81 heat exchange stations are constructed and two water replenishing stations are constructed respectively in Qiaodong and Qiaoxi. The heat source of district heating in Pingshan County is Xibaipo CHP Plant with a design heating area of 7,500,000m^2.	At present, there is no district heating pipeline network within the subproject service area, and the existing 336 thousand m2 of residential and office building area are heated by the separate constructed gas-fired boiler, ground source heat pump, central air conditioning, etc. There is no heat source for the residential area of 8,402,100 m^2 which is under construction and planning. Upon completion, the Subproject will provide district heating service to the following areas: 1) the area east of Binjiang Road and north of Quanbei Street to the west of the railway; 2) the area north of Tuanjie Street and west of Xiangdu Road to the east of the railway.	In the existing heating construction area of about 6.071 million square meters within Zhangjiakou Shiqiao eastern region, 3.485 million square meters has achieved district heating, and the remaining 2.587 million square meters of heating area is heated by scattered small boiler. According to the plan, there is an area of nearly 5 million square meters in the heating service area of Dongyuan Thermal Company needed to address the issue of district heating. Construction of the Subproject will enable residential buildings and public buildings with a total area of 8,489,000m^2 to receive district heating service, including a building area of 2,587,000m^2 currently heated by 99 coal-fired small heating boilers. The heating area of the Subproject is the area north of Hongqilou South Street and east of Shengli Road and Xuanhua Avenue in Qiaodong District.

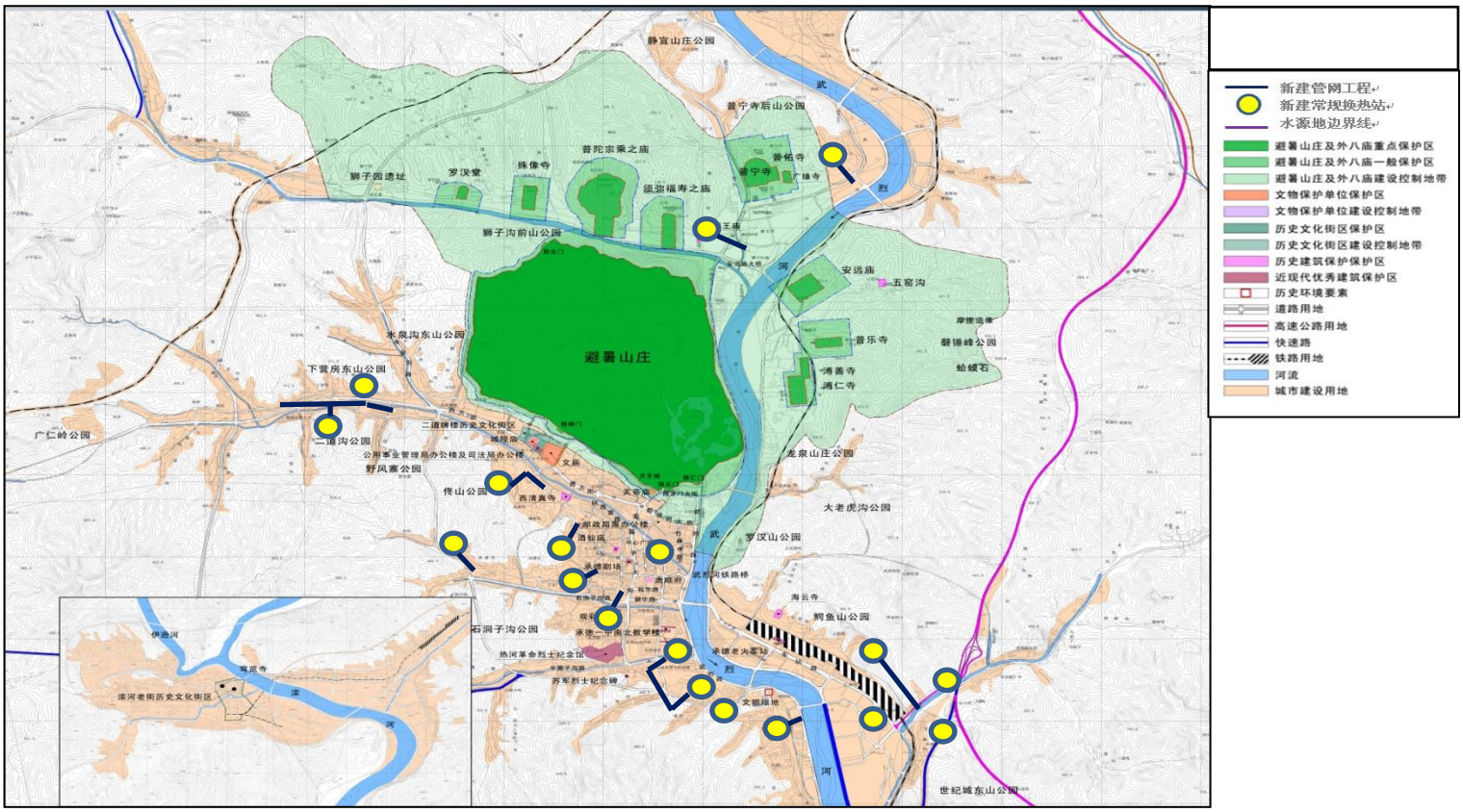


Figure 4-1 Location Relationship between Chengde Subproject and Locations of the Cultural Relics

4.3 Key Environmental Problems

Results of environmental monitoring for years indicate that Hebei Province has a number of environmental and ecological problems including serious pollution of air environment and water environment, seriously excessive exploitation of ground water, decrease of water resources, quality deterioration and area reduction of forests, massive degradation of steppe, serious land desertification and soil erosion, serious pollution of farmland soil caused by chemical fertilizers and pesticides and reduction of biodiversity. The four subproject cities and counties, as a part of Hebei Province, also have the same environmental problems, only different in degree.

1) Air Environment

Air pollution exists in the four subproject cities (counties) to different extents, and is the worst in winter. Air pollution is characterized with coal-burning pollution, and with major pollutants including sulfur dioxide, nitrogen oxides, and particulates (PM10 and PM2.5). The pollution is more serious especially when weather condition is bad.

Among the four cities / counties, Xingtai City experiences the most serious problem of air pollution and is the Chinese city with relatively high frequency of fog and haze and high level of pollution and also one of the Chinese cities with very poor air quality.

2) Water Environment

Universal pollution of water bodies and degraded quality of water environment is a common problem for all four cities and counties. Although the water quality monitoring sections of the other three cities / counties except Xingtai satisfy the requirements of functional zone planning. In terms of the watershed alone, the situation is very unoptimistic where discharge of industrial

wastewater and domestic sewage and NPS pollution from agriculture have aggravated organic pollution of surface water bodies.

The situation of ground water is also unoptimistic. Seriously excessive exploitation has resulted in geological problems and also the problem of aggravated industrial pollution. In this regard, Xingtai City has the most severe situation among the four subproject cities and counties.

3) Construction of livable city is also an important mission facing the four subproject cities/counties, in particular, Pingshan County and Xingtai City.

5. Environmental Impact Assessment and Mitigation Measures

5.1 Analysis of Environmental Protection Issues in Similar Projects in China

5.1.1 Key Issues

Replacing small boilers and household heating furnaces with urban district heating is an energy saving and high energy efficiency approach. It is also favorable to effective mitigation of environmental pressure. Using clean energy as fuel for district heat is the development direction that Hebei Province promotes the institutional reforms of energy sector and facilitates industrial upgrading. Based on the analysis of the practical operation experiences in district heating of various regions, such projects have the following environmental concerns:

1) Slow construction of associated heating pipelines makes unlikely simultaneous implementation of district heating. In many regions, due to the absence of a complete pipeline system, it becomes impossible to remove the small boilers of high energy consumption and heavy pollution in the heating area and implement the “big-for-small” comprehensive regional environment management initiative.

2) Some urban areas use medium-sized coal-fired boilers for regional district heating in winter, not only finding it difficult to achieve the scale effect of such facilities, but also resulting in heavier air pollution in the heating season due to the absence of pollution prevention and control measures.

3) Unreasonably planned thermal power projects are unable to achieve the heating load. Such projects, constructed in the name of thermal power plants, are actually coal-fired power plants that bring stronger pressure on regional environment pollution. In such a background, some cities have to continue using small and medium-sized coal-fired boilers for urban heating, which increases environmental pollution in cities.

4) If a thermal power plant is sited too close to residential communities without noise reduction measures and with an unreasonably designed layout plan, the noise during actual operation from the thermal power plant will affect the livelihood and daily activities of local residents.

5) The heating facilities, such as the thermal stations, are generally located in residential communities and may disturb residents due to poor equipment operation.

6) During operation, pipe networks may have problems such as corrosion and leakage, damages by external forces and pipeline occupation.

5.1.2 Experiences and lessons learnt

1) Urban heating network is a part of the infrastructures of a city and deserves strong supports from the city government departments for the purpose of simultaneous construction and commissioning with the heat source facilities (CHP plants) and full realization of the environmental benefits of a CHP district heating project.

2) Incentives should be provided to use clean energy as fuel of heating boilers. Investment in environmental protection facilities should be increased and environment management should be strengthened. Emission of air pollutants should be reduced, assuring the compliance with smoke emissions standards.

3) Construction activities should be reasonably scheduled and thermal stations should be reasonably located. High-noise equipment should be located as far away from residential buildings as possible, with effective control actions taken to reduce noise impacts. There are numerous examples of such negative experiences. For example, in 2008 and 2012, residents in Beijing complained to the heating companies for noise disturbances in the operation of heat exchange station pumps and night time installation of heating pipelines.

4) A reasonable traffic plan should be developed for road sections with ongoing construction activities to avoid traffic congestion and possible traffic disturbance to residents due to pavement breaking.

5) The construction requirements must be strictly followed to avoid problems of corrosion and leakage, damages by external forces, and occupation of pipelines.

6) Procedures and requirements for operation and maintenance and management should be strictly followed to avoid impacts on pipeline stability due to the failure of pipeline equipment (such as damaged valves).

5.1.3 Responsive Actions to be Taken under the Project

The aforesaid experiences and lessons learnt had been fully considered and responsive actions had been taken during the design and preparation stage of the Project. In the construction and operation stages of the Project, such experiences and lessons learnt were also taken into full account with detailed responsive actions developed. These actions have been reflected in the environmental measures of the respective stages of the Project in this chapter.

5.2 Mitigation Measures Considered in the Design and Preparation Stage

During the design and preparation stage of the Project, the following mitigation measures to the environmental problems were considered and implemented based on the experiences and lessons learnt from similar projects:

1) The existing local heat sources should be used to achieve CHP and optimizing the heating pipelines to achieve large-area district heating.

2) CHP construction under each subproject complies with the local heating plan and the heat sources involved are determined in the heating plan with specified heating region and heating load and are the only key heat source in the heating region, thus involving no repetitive construction of CHP project. In addition, heating pipeline construction has been implemented by local heating departments simultaneously with the Project, involving no mismatch of construction progress between the heating pipelines and the Project.

3) The issue of gradual realization of clean fuel utilization has been taken into account to reduce pollutant emission and improve regional air environment quality in cities.

4) The issue of thermal balance stability of the pipeline system has been considered in the design. Installation of pressure difference balance valves has been included into the scope of works of some subprojects.

5) Site selection of heat exchange station has taken full account of minimizing adverse environmental impacts on sensitive targets.

6) It is required to develop a reasonable construction plan in the design and preparation stage to strengthen inspections during the construction stage to identify and handle abnormalities of pipeline occupation, cross construction, damages by external forces in a timely manner.

7) Operation requirements for the operation stage should be developed in the design and preparation stage to conduct periodical inspections and tours of heating pipelines. Signal cables for leakage monitoring should be precast in the pipeline isolation courses to achieve real-time monitoring and timely identification and repair of leakages of the pipelines.

8) Low-noise and environment-friendly equipment should be selected and maintained and repaired on a periodical basis as required; upon installation of water pumps, the inlet and outlet pipes of the pumps should be equipped with vibration-absorbing pumps and vibration-absorption actions must be taken for the pump foundation and noise isolation

hoods installed to reduce noise; doors and windows of the heat exchange station must be designed as noise isolating doors and double-glazed windows; heat exchange stations should adopt noise isolation structure; equipment in the newly built thermal stations must be reasonably distributed and arranged.

9) Construction design of the Project has taken full account of possible impacts on physical and cultural resources, social activities, and urban traffic. Measures should be taken to avoid or reduce such adverse impacts.

10) Adequate arrangements have been made during the project preparation stage for public participation to enable the development of a sound construction plan and assure smooth implementation of the construction activities.

11) Upon cost estimation during the FSR preparation, costs of environmental mitigation measures and environmental monitoring should be included. In addition, such estimated costs should be included into the construction contract with the construction companies, with the responsibilities and assignments of all parties specified.

12) Stronger efforts should be made in emergency response rehearsal, public relation and advertisement to strengthen safety awareness and avoid possible disorder or delay of emergency response actions to any accidents in the construction and operation stages and avoid possible safety risks caused by external factors.

5.3 Environmental Impact Assessment and Mitigation Measures

5.3.1 Prediction and Assessment of Impacts on Air Environment

Status analysis of air environment: For the four subproject cities / counties, the primary pollutant is inhalable particular matters, including PM10 and PM2.5. The sources of air pollutants include: 1) external dust brought by seasonal wind and local dust; 2) SO2 and NOx among other pollutants emitted from industrial production and burning; 3) pollution caused by exhaust gas emitted by motor vehicles. For the four subproject cities / counties, heavy load of pollutants are emitted in winter heating season, resulting in higher concentration of inhalable particular matters in winter than the other periods. In addition, SO2 and NOx concentration is obviously higher than the non-heating periods. As a result, air environment quality in winter heating period is worse.

5.3.1.1 Prediction and ssessment of impacts on air environment during the construction stage

1. Pipe Network Construction

Air pollutants generated in the course of pipe network construction mainly come from: (1) dust generated during the course of road excavation and backfill, stockpiling and transportation of materials and debris; (2) exhaust gas emitted by the various kinds of construction machinery; (3) minor welding smoke generated in the course of pipeline welding.

1) Dust: Construction dust causes the biggest impact on air environment in the construction stage. Origins of such dust include road excavation and backfill, stockpiling and transportation of materials and debris. Dust on construction sites generated from transportation vehicle operation accounts for around 60% of the total construction dust. The amount of dust on construction sites is related to a number of factors including conditions and management of construction sites, level of mechanization, season of construction, soil texture, and weather conditions. According to an analog survey, construction dust involves a relatively small scope of impact, usually within a range of 50m outside the construction site boundary, and its leeward scope of impacts is usually within approximately 150m.

2) Machinery exhaust gas: During construction, the number of construction machinery will

increase, mainly fuel-driven machinery that will generate a certain amount of exhaust gas during construction. Pollutants contained in the exhaust gas mainly include CO and NO_2. During the construction of the Project, a small number of construction machinery will be involved and they will be distributed in a decentralized way. In addition, such machinery will move as the construction sections change. Therefore, the level of pollution caused by such construction machinery will be relatively low and their impacts on the surrounding areas are not only small but also short in duration.

3) Welding smoke: A small volume of welding smoke will be generated during the welding operation of pipeline connections. Since the welding operation to be involved under the Project will be small in volume and short in duration, the general impacts on air environment will be very minimal.

2. Construction of Community Heat Exchange Station and Building-level Heat Exchange Station

Construction activities of the community heat exchange stations and building-level heat exchange stations in the subprojects are mostly in the heat exchange station workshops preserved in newly built communities or renovations of existing small boiler houses and equipment installation. Because the dust prevention function of buildings, such construction operations themselves produce no obvious dust. However, during the construction of the heat exchange station buildings, it is necessary to stockpile construction materials and sand and aggregates among other dusty materials around the communities that will cause certain dust, but small in volume, generating very minor impact on the surrounding residential communities and other sensitive sites.

3. Construction of Primary Heating Station in Xingtai Subproject

Certain amount of dust will be generated in the course of construction of the civil works of the primary heating station as well as stockpiling and transportation of construction materials. Earthwork excavation, stockpiling and backfill, cement and sand transportation, loading and unloading and stockpiling tend to generate certain dust in windy weathers. Transportation vehicles leaving and arriving at the construction sites will generate dust. In addition, tail gas emitted by such vehicles will generate certain impacts on air environment.

Dust generation in the construction stage is related to a number of factors such as conditions and management level of construction sites, mechanization level and weather conditions, which are hard to quantify. It is known from analog investigation that the scope of impacts of construction dust at a regional annual wind speed of 2.5m/s is mainly within 200m. The construction site of the primary station is 320m away from Shixiang Village and dust generated in the course of construction will produce very minor impacts on the village.

4. Construction of Pressure Isolation Heat Exchange Station in Zhangjiakou Subproject

Certain amount of dust will be generated in the course of construction of the civil works of the pressure isolation heat exchange station as well as stockpiling and transportation of construction materials. Earthwork excavation, stockpiling and backfill, cement and sand transportation, loading and unloading and stockpiling tend to generate certain dust in windy weathers. Transportation vehicles leaving and arriving at the construction sites will generate dust. In addition, exhaust gas emitted by such vehicles will generate certain impacts on air environment.

It is known from the analog investigation that the scope of impacts of dust from construction of the pressure isolation heat exchange station is primary within 50m while the construction operation areas are respectively located at a distance of 13.5m and 8.5m from the staff residential building of the local branch of China Unicom and that of No. 251 Hospital, which will expect relatively strong dust impacts during the construction period. In order to reduce impacts of construction dust on the surrounding residential buildings and other sensitive targets, actions of dust depression must be taken.

5. Coal-to-Gas Boiler Fuel Conversion in Zhangjiakou

The Coal-to-Gas boiler fuel conversion for Zhangjiakou Dongyuan Heating Co., Ltd. is constructed in the existing workshops. The construction activities themselves produce no obvious dust and the impacts on the air environment in the construction stage are very minor.

5.3.1.2. Prediction and assessment of impacts on air environment during the operation stage

1. Heat exchange station and pipelines

The heat exchange stations (including the primary stations in Xingtai Subproject and the pressure isolation heat exchange stations in Zhangjiakou Subproject) and the pipe networks generate no air pollutants during the operation stage, thus involving no impacts on ambient air environment.

2. Coal-to-gas Boiler Fuel Conversion in Zhangjiakou Subproject

The key impact on the air environment during the operation stage after the coal-to-gas boiler fuel conversion is carried out by Zhangjiakou Dongyuan Heating Co., Ltd. will be exhaust gas emitted by the gas-fired boilers.

(1) Source intensity

2 coal-fired boilers will be converted into 2 Nos. 70MW gas-fired hot water boilers, each with a natural gas consumption of approximately 7500Nm^3/h. Fume generated by the gas-fired boilers is emitted via chimneys. Each boiler has one chimney with a size of 40m×Φ2.0mm and respectively numbered Chimney No. 1# and No. 2#. It is assumed that the gas-fired boilers operate 18 hours a day at full load for approximately 2700 hours per year. **Table 5-1** shows the predicted emission of exhaust gas and pollutants by the converted gas-fired boilers.

Table 5–1 Prediction of Exhaust Gas and Pollutant Emission of Gas-fired Boilers

Function		Single boiler	Total (2 boilers)	Standard limit (GB13223-2011)
Rated heating capacity (MW)		70	140	/
Fuel type		Natural gas		
Fuel consumption (Nm^3/h)		7500	15000	
Smoke	m^3/h	92250	184500	
	m^3/a	249075000	498150000	
SO_2	Source intensity (g/s)	0.128125	0.25625	/
	Emission concentration (mg/Nm^3)	5	5	35
	Emission capacity (t/a)	1.245375	2.49075	/
NO_X	Source intensity (g/s)	2.5625	5.125	/
	Emission concentration (mg/Nm^3)	100	100	100
	Emission capacity (t/a)	249.075	498.15	/
Dust	Source intensity (g/s)	0.128125	0.25625	/
	Emission concentration (mg/Nm^3)	5	5	5
	Emission capacity (t/a)	1.245375	2.49075	/

It can be seen from the table above that exhaust gas emitted by the gas-fired boilers in the Project complies with the standard limits required in Table 2 of GB13223-2011 “Emission Standard for Air Pollutants of Thermal Power Plant”. After conversion, the boiler fuel will be converted from coal to natural gas as a clean energy. Key pollutants emitted from combustion of natural gas include SO_2, smoke and NOx. With very low concentration, SO_2 and smoke will not be considered in this prediction and evaluation. NOx will be the key pollutant of gas-fired boiler smoke to be considered in this evaluation. In the Project, the excessively low nitrogen

combustion technology will be used to control the NOx concentration below 100mg/Nm^3. **Table 5-2** shows the parameters of calculation for air environment pollution sources during the operation stage after coal-to-gas conversion of the boilers.

Table5–2 List of Parameters of Calculation for Key Pollution Sources

Parameter		Symbol	Unit	Data
Ref. No. of Point Source		Code	/	1
Description of Point Source		Name	/	Single chimney for 70MW furnace
Emission capacity		Q	m^3/h	92250
Height of exhaust stack		H	m	40
Diameter of exhaust stack		D	m	1.6
Outlet speed of exhaust gas		V	m/s	12.75
Outlet temperature of exhaust gas		T	K	363
Source intensity of evaluation factor	NOx	Q_{NO2}	g/s	2.30625
		C_{NO2}	mg/m^3	90

Note: Source intensity for NOx is considered as NO_2/NO_X=0.9.

(2) Prediction Model

The estimation model recommended in HJ2.2-2008 “Technical Guidelines on Environmental Impact Assessment --- Air Environment” is adopted. The estimation model is a single-source prediction model and it is able to calculate the maximum ground concentration of pollution sources such as point source, non-point source and physical source as well as the maximum ground concentration of buildings in the special circumstances and fumigation. Multiple preset combinations of meteorological conditions are embedded, including some most adverse meteorological conditions that may or may not occur in a certain region.

(3) Prediction and Evaluation Factors

After conversion, the boiler fuel will be converted from coal to natural gas as a clean energy. NOx will be the key pollutant emitted from natural gas combustion. NOx is the key pollutant of gas-fired boiler smoke to be considered in this evaluation.

(4) Analysis of Prediction Results

See **Table 5-3** for the results of calculation of pollutants normally emitted from the chimney of one single 70MW gas-fired boiler in the Project.

Table5–3: Results of Calculation of the Single-chimney Estimation Model of 70MW Gas-fired Boilers

SN	Leeward Distance from Source Center (m)	NO_2	
		Predicted Concentration (mg/m^3)	Percentage of standard limit (%)
1	10	0	0
2	100	0.00311	1.555
3	200	0.0135	6.75
4	300	0.01482	7.41
5	400	0.01404	7.02
6	500	0.01366	6.83

SN	Leeward Distance from Source Center (m)	NO_2	
		Predicted Concentration (mg/m^3)	Percentage of standard limit (%)
7	600	0.01309	6.545
8	700	0.01236	6.18
9	800	0.01408	7.04
10	900	0.01618	8.09
11	1000	0.01766	8.83
12	1500	0.01932	9.66
13	2000	0.0175	8.75
14	2500	0.01531	7.655
15	3000	0.01339	6.695
16	Max. leeward concentration (1362m)	0.01947	9.735

Note: Standard limit of NO_2 is 0.20mg/m^3.

It is known from Table 5-3 that the hourly maximum average concentration of NO2 emitted from one single chimney of gas-fired boiler after coal-to-gas conversion is 0.01947mg/m3 and the maximum contribution accounts for 9.735% of the standard limit; since the two chimneys are closely located, the maximum contribution of the superposition of both chimneys accounts for 19.47% of the standard limit, lower than the standard concentration limit.

Based on the above calculation, after coal-to-gas conversion of the boilers is implemented, emission of NOx, SO2 and smoke among other pollutants is reduced by 279.45t/a, 431.5t/a and 334.46t/a than before when coal is used as the fuel, respectively by 35.93%, 99.94% and 99.25%. It is thus obvious that coal-to-gas conversion of the boilers will significantly benefit the improvement of air environment quality in the region.

(5) Height Conformity of Gas-fired Boiler Chimney

Specific requirements are included in Emission Standard of Boiler Air Pollutants (GB13271-2014). It is required that “the chimneys of newly built boiler houses with buildings within a radius of 200m shall be 3m or more higher than the highest building”. After conversion the design height of chimneys is 40m, 8m higher than the 32m high boiler house building located closest to the chimney, satisfying the requirements of the standard.

5.3.2. Mitigation Measures of Ambient Air Impacts

5.3.2.1 Mitigation measures of Ambient Air Impacts during the Construction Stage

1. Mitigation measures of impacts from pipe network construction

Dust will be the key ambient air impact during the construction stage of the Project, with little impacts from machinery exhaust gas and minor welding smoke. It is required that the construction companies shall take the following mitigation measures to reduce their impacts:

1) Actions of fencing and water spraying should be taken in the construction sites. Fences around the construction sites should be secure and tidy. Construction wastes generated should be removed on the same day. Open earthwork excavation and long-time stockpiling of wastes shall be prohibited.

2) Construction materials and earthwork that may easily generate dust in the course of construction shall be covered with dust control cloth.

3) Water spraying should be done for excavation and backfill of very dry earth to minimize dust suspension. Earthwork excavation and backfill should be suspended in windy time (level 4 or higher) and the local construction site should be covered with dust control cloth.

4) Construction material, construction debris, and waste soil should be transported in closed

vehicle. Tossing and throwing in the air and uncivilized handling are prohibited. Transportation vehicles should slow down when cross sensitive area to reduce impact to surrounding environment；

5) Entrances and exits of construction sites shall be cleaned periodically and vehicle washing facilities provided to prevent dust and mud from being taken away from the sites;

6) Welding operations shall be conducted within site fences, which, if necessary, shall be increased in number and height of site fences;

7) On-site concrete mixing operation is prohibited and pre-mixed mortar shall be used instead; on-site bitumen mixing and boiling is prohibited;

8) Transportation vehicles and construction machinery should be equipped with exhaust purification device to ensure compliance with exhaust emission standards. Exhaust gas emission chimneys for fixed equipment shall be located far away from residential communities and be provided with an adequate height to facilitate diffusion;

9) Construction machinery should be in compliance with applicable pollution control standards and with regular maintenance;

10) A dedicated environmental should be designated for environmental protection during construction to provide trainings for workers and ensure implementation of various dust control measures;

11) Construction site fencing and other temporary structures should be removed within 2 days after construction completion, and construction site should be cleaned.

2. Mitigation measures of impacts from heat exchange station construction

Construction of community and building-level heat exchange stations is mainly conducted within buildings. Under the effect of building dust prevention, the construction activities themselves involve no obvious dust emission. However, in the course of construction of the heat exchange station buildings, short-time storage of small volume of construction materials or construction debris may become necessary nearby the construction sites. Sand and aggregates may generate dust in windy conditions, thus producing adverse impacts.

For this reason, the following mitigation measures shall be taken to reduce their impacts:

1) Materials in storage that may easily generate dust shall be covered with dust prevention cloth.

2) Construction wastes generated shall be removed on the same day and shall not be long-time stockpiled.

3) Earthwork excavation and backfill should be suspended in windy time (level 4 or higher) and transportation of dusty materials at construction site should be prohibited.

4) Construction material, construction debris and waste soil should be transported in closed vehicle. Tossing and throwing in the air is prohibited and actions shall be taken to prevent spillage of materials along the transportation route.

5) On-site concrete mixing operation is prohibited and pre-mixed mortar shall be used instead; on-site bitumen mixing and boiling is prohibited.

6) Transportation vehicles and construction machinery should be equipped with exhaust purification device to ensure compliance with exhaust emission standards. Exhaust gas emission chimneys for fixed equipment shall be located far away from residential communities and be provided with an adequate height to facilitate diffusion;

7) A dedicated environmental should be designated for environmental protection during

construction to provide trainings for workers and ensure implementation of various measures for dust control；

8) Upon completion of a construction activity, the construction company shall clean the stockpile place within one week and tidy up the surrounding areas.

3. Mitigation measures of impacts from construction of primary heating station of Xingtai Subproject

The following actions shall be taken to mitigate such impacts:

1) Key roads and operation sites on the construction sites shall be paved and exposed sites and earth stockpiles shall be covered, hardened or vegetated; material stockpiling sites on the construction sites shall be leveled and solid and fine particle construction materials that can easily become fugitive shall be enclosed or covered; construction sand shall be stockpiled and aggregates of different sizes shall be separately stockpiled, with covering cloth or other dust control actions taken.

2) Construction wastes shall be stockpiled in a centralized and categorized way and tightly covered up and removed out of site in a timely manner; the construction wastes shall be transported in fully-enclosed trucks or covered up with tarpaulin to avoid spillage on the way.

3) Water spraying shall be conducted at fixed time on a daily basis over the dust raising areas and road sections on construction sites;

4) Vehicle washing sites shall be provided at the entrances and exits of construction sites to clean wheels of arriving and departing vehicles. Enclosing and covering actions shall be taken upon transportation of earth and stone, cement, lime and other construction materials to avoid spillage on the way.

5) In the case of a windy weather of Level 4 or higher or an air quality alarm issued by the municipal government, the construction companies shall suspend all earthwork constructions.

4. Mitigation measures for impacts from construction of pressure isolation heat exchange station in Zhangjiakou Subproject

Impacts on air environment generated during the construction of the pressure isolation heat exchange station mainly include dust and machinery exhaust gas generated in the construction period. The following mitigation measures shall be taken to reduce impacts on the dormitory buildings of No. 251 Hospital, No. 3 residential building of China Unicom and the surrounding environment.

1) Construction materials and earthwork that can easily become fugitive in the course of construction shall be covered with dust prevention cloth;

2) Water spraying should be done for excavation and backfill of very dry earth to minimize dust suspension. Earthwork excavation and backfill should be suspended in windy time (level 4 or higher) and the local construction site should be covered.；

3) Actions of fencing and water spraying should be taken in the construction sites. Temporary dust prevention net walls shall be provided on the side of the construction sites adjacent to China Unicom No. 3 Building and No. 251 Hospital Staff Dormitory Building to reduce dust; Construction wastes and debris should be removed on the same day. Open earthwork excavation and long-time stockpiling of wastes shall be prohibited.

4) Materials and construction wastes shall be transported in an enclosed way. Tossing and throwing and uncivilized handling shall be prohibited. Actions shall be taken to prevent the

materials from spillage on the way and reduce secondary dusting during transportation. Transportation vehicles crossing sensitive sites shall travel in slow speed to reduce impacts on the surrounding environment.

5) Entrances and exits of construction sites shall be cleaned periodically and vehicle washing facilities provided to prevent dust and mud from being taken away from the sites;

6) On-site concrete mixing operation is prohibited and pre-mixed mortar shall be used instead；

7) The construction companies shall assign a special person to be responsible for environmental protection in the construction stage; training shall be provided to operators and actions for construction dust control shall be strictly implemented.

5. Mitigation measures for impacts from construction of boiler fuel coal-to-gas conversion in Zhangjiakou Subproject

Construction activities involved in the boiler fuel coal-to-gas conversion of Zhangjiakou Dongyuan Heating Company are mainly conducted within existing workshops. Under the effect of building dust prevention, the construction activities themselves involve no obvious dust emission. However, in the course of construction of the heat exchange station buildings, construction materials and sands and aggregates will be stored inside the construction sites. Sand and aggregates may generate dust in windy conditions. Thus, the following mitigation measures shall be taken to lower the adverse impacts:

1) Sites for material stockpiling and operation shall be paved and exposed sites and earth stockpiles shall be covered, hardened or vegetated; material stockpiling sites on the construction sites shall be leveled and solid and fine particle construction materials that can easily become fugitive shall be enclosed or covered; construction sand shall be stockpiled and aggregates of different sizes shall be separately stockpiled, with covering cloth or other dust control actions taken.

2) Construction wastes shall be stockpiled in a centralized and categorized way and tightly covered up and removed out of site in a timely manner; the construction wastes shall be transported in fully-enclosed trucks or covered up with tarpaulin to avoid spillage on the way.

3) Water spraying shall be conducted at fixed time on a daily basis over the dust raising areas and road sections on construction sites;

4) Enclosing and covering actions shall be taken upon transportation of earth and stone, cement, lime and other construction materials to avoid spillage on the way；

5) In the case of a windy weather of Level 4 or higher or an air quality alarm issued by the municipal government, the construction companies shall suspend all earthwork constructions

6. Mitigation measures of environmental impacts from construction dust on special sensitive targets

For the special sensitive targets, tailored mitigation measures as follows need to be taken and strengthened during construction to reduce impacts from construction. See **Table 5-4** for detail.

Table 5–4 Mitigation Measures of Environmental impacts from Construction Dust on Special Sensitive Targets

Types of special sensitive targets	Mitigation measures
Residential buildings, office buildings, shops and stores	a) Increasing the frequency of water spraying (to 2 to 3 times a day) to minimize dust; b) Providing high fences (with a height of no less than 2.5m) around construction sites; providing dust prevention nets if necessary; c) Prohibiting tossing and throwing construction debris from height; d) Scheduling construction activities reasonably and prohibiting construction at night and in windy days; e) Locating stockpiling sites away from special sensitive targets; f) Covering all temporary stockpiles; **g)** Assuring transportation vehicles to travel in slow speed into and out of construction sites to minimize dust; assuring compliance with exhaust gas emission standards.
Schools, hospitals, etc.	a) Increasing the frequency of water spraying (to 2 to 3 times a day) to minimize dust; b) Providing high fences (with a height of no less than 2.5m) around construction sites; providing dust prevention nets if necessary; c) Prohibiting tossing and throwing construction debris from height; d) Scheduling construction activities reasonably to avoid school time; prohibiting construction at night, during school exams, and in windy days; minimizing construction operation time on road sections near schools and hospitals; e) Locating stockpiles away from schools and hospitals; f) Covering all temporary stockpiles; **g)** Assuring transportation vehicles to travel in slow speed into and out of construction sites to minimize dust; assuring compliance with exhaust gas emission standards.
Important road intersections	a) Increasing the frequency of water spraying (to 2 to 3 times a day) to minimize dust; b) Providing high fences (with a height of no less than 2.5m) around construction sites; providing dust prevention nets if necessary; c) Covering all temporary stockpiles to minimize dust.

5.3.2.2 Mitigation measures of ambient air impacts during the operation stage

1. Heat exchange station and pipe network

The heat exchange stations (including the primary heating station of Xingtai Subproject and the pressure isolation heat exchange station of Zhangjiakou Subproject) and pipe network generate no exhaust gas and dust during the operation stage, thus requiring no mitigation measures of air pollution prevention and control.

2. Mitigation measures of impacts during the operation stage of the boiler fuel coal-to-gas conversion of Zhangjiakou Subproject

In the boiler fuel coal-to-gas conversion to be implemented by Zhangjiakou Dongyuan Heating Company, super low nitrogen combustion device will be used to reduce NOx generated in gas combustion. In addition, the exhaust gas purification system will further reduce the amount of pollutants discharged into the atmosphere. In the process design stage of the Project, use of emission reduction equipment has been taken into full account and the super low nitrogen combustion device has been included into the design of the entire engineering system to restrict generation of NOx and reduce NOx concentration in exhaust gas to the minimum. The new technological device and purification system will assure that the emission is not only complied, but also significantly lower than the standard limit.

5.4 Prediction and Evaluation of Impacts on Acoustic Environment and Impact Mitigation Measures

5.4.1 Prediction and Evaluation of Impacts on Acoustic Environment

Status analysis of acoustic environment: Environmental noise in the four subproject cities / counties mainly comes from local traffic. Site monitoring shows that, apart from the 3 proposed construction sites in Zhangjiakou Subproject where the traffic noise impacts fail to meet the standard, the acoustic environment quality of the proposed construction areas of the other subprojects meets the noise control requirements specified in Acoustic Environment Quality Standard (GB3096-2008).

5.4.1.1 Prediction and evaluation of impacts on acoustic environment in the construction stage

1. Noise sources

During the construction of the heat exchange stations (community and building-level heat exchange stations) and the primary heating station of Xingtai Subproject and the pressure isolation heat exchange station of Zhangjiakou Subproject and all pipe network, it is necessary to use all types of mechanical equipment, including excavation equipment, air compressors, loaders, vibrators, electric welders, electric drills and hydraulic drills, heavy trucks, pavement breakers, etc.. These equipment will generate serious impacts on acoustic environment of the construction area. The noise source intensity can be as high as 78 to 95dB(A). Noise during night construction is even more outstanding and cannot be neglected. **Table 5-5** shows the key equipment (sound source) and sound strength during the construction stage.

Table 5–5 Statistics of Key Noise Sources in Different Phases of Construction

Construction plant	Noise level (dB(A))	Construction plant	Noise level (dB(A))
Excavator	80～95	Air compressor	85～93
Loader	85～92	Electric saw	85～95
Pavement breaker	90～100	Welder	75～85
Truck	78～85	Electric drill	85～94
Vibrator	80～86	Temporary power generator	85～96

Prediction of noise impacts in the construction stage is conducted using the point sound source distance attenuation prediction model. Based on such prediction, the impacts of noise on the surrounding environment in the construction stage are analyzed. Noise sources in the construction stage are mostly point sources and the point source attenuation model is used to calculate the distance attenuation of construction plant noise using the following formula:

$$L_2 = L_1 - 20\lg(r_2/r_1) + \Delta L$$

Where: L_1, L_2— respectively referring to sound level (dB(A)) of the sound source at distance r_1 and r_2;

r_1, r_2— distance from the point sound source (m);

ΔL— reduced noise level of the other attenuation function (dB(A)).

Table 5-6 shows the calculation results of distance attenuation of noise of construction plants.

Table 5–6 Prediction Results of Noises from Construction Plants

Name of sound source	Noise level	Noise value at different distances from sound source (dB(A))							
		5m	10m	20m	40m	60m	80m	100m	150m
Excavator	95	81	75	69	63	59	57	55	51
Loader	92	78	72	66	60	56	54	52	48
Pavement breaker	100	86	80	74	68	64	62	60	64
Truck	85	71	65	59	53	49	47	45	41
Vibrator	86	72	66	60	54	50	48	46	42
Air compressor	93	79	73	67	61	57	55	43	39
Electric saw	95	81	75	69	63	59	57	45	41
Electric welder	85	71	65	59	53	49	47	45	41
Electric drill	94	80	74	68	62	58	56	54	48
Temporary power generator	96	82	76	70	64	60	58	56	50

2. Impact analysis

Pipe network construction is usually carried out in open air, thus involving long distance and relatively vast area of noise impacts. It is known from pollution source analysis that noise sources on construction sites mainly include the various types of high-noise construction plants with a unit sound level of more than 75dB(A) and even up to 100dB(A) for some equipment. In addition, equipment involved in pipe network construction involves frequent change of locations and fluctuation of the number of equipment in operation at different times in the same construction period, making it very difficult to accurately predict noise values at the boundary of the construction sites. However, **Table 5-5** shows that the mixed noise strength on the construction site can reach more than 100dB(A), which is attenuated to 70dB(A) at a distance of more than 40m, to 55dB(A) at a distance of more than 100m, meaning that the noise standard specified for daytime (70dB(A)) and nighttime (55dB(A)) in GB12523-2011 “Environmental Noise Emission Standard at the Boundary of Building Construction Sites”. Although the Project involves no nighttime construction, since the construction areas of the Project are mostly located in the urban centers and close to residential communities and other sensitive targets, with some roadside residential buildings located at a distance of less than 20m from construction areas, if no mitigation measures are taken, noise strength outside the windows of residents may reach 80dB(A) or even more, far much higher than the Class 4a standard for both daytime (70dB(A)) and nighttime (55dB(A)) specified in GB3096-2008 “Acoustic Environment Quality Standard”. Therefore, effective actions shall be taken to minimize impacts on residents.

Generally speaking, due to the short duration of pipe network construction, the impacts on the sensitive targets in the surrounding are temporary and may meet the standard requirements if effective actions are taken.

Furthermore, the construction and renovation of thermal stations, installation of connecting pipelines and heat metering devices are mainly carried out indoors and involve relatively light work load and short duration. If effective measures are taken, the impacts on the surrounding sound environment may be reduced to minimum.

Construction activities of the boiler fuel coal-to-gas conversion conducted by Zhangjiakou Dongyuan Heating Company are mainly implemented inside the buildings. Because of the noise reduction function of buildings and the far distance from the various sensitive sites, noise impacts produced by such construction activities outside the boundary are also minimal.

5.4.1.2 Prediction and evaluation of impacts on acoustic environment in the operation stage

All the subprojects involve no noise impacts from pipe network during the operation stage. The key noise impacts come from water pumps in the heat exchange stations. The prediction and analysis of noise impacts during the operation of such equipment are described as follows.

1. Prediction model

The prediction model specified in HJ2.4-2009 "Technical Guidelines for Environmental Impact Assessment --- Acoustic Environment" for prediction of the contribution value of point sound source to boundary noise at the prediction point is adopted to predict the contribution value of equipment noise to boundary noise and the environmental noise value after superposition of background value. The prediction model is described as follows:

(1) Basic formula for calculation of level of sound generated at the prediction point by single point source

$$L_P(r) = L_W + D_C - A$$

Where: $L_p(r)$ — sound pressure level of octave band at the prediction point, dB;

L_W — sound power level of octave band, dB;

D_C — directional correction, dB;

A — octave band attenuation, dB.

(2) Calculation of noise contribution value

If Sound Level A generated by outdoor sound source No. i is Lai, the working time of this sound source within time T is ti; and if Sound Level A generated by equivalent outdoor sound source No. j is LAj and the working time of this sound source within time T is tj; the contribution value (Leqg) of the sound source of the proposed project to the prediction point is:

$$L_{eqg} = 10\lg\left[\frac{1}{T}\left(\sum_{i=1}^{N} t_i 10^{0.1LA_i} + \sum_{j=1}^{M} t_j 10^{0.1L_{AJ}}\right)\right]$$

Where: T — time for calculation of equivalent sound leve, s;

N — number of outdoor sound sources;

M — number of equivalent outdoor sound sources.

(3) Prediction value calculation

The calculation formula of the predicted equivalent sound level (L_{eq}) at the prediction point is :

$$L_{eq} = 10\lg(10^{0.1L_{eqg}} + 10^{0.1Leqb})$$

Where: L_{eqg} — equivalent sound level contribution value of the sound source at the prediction point, dB;

L_{eqb} — background value of the prediction point, dB.

2. Prediction and analysis of noises of heat exchange station during the operation stage

Heat exchange stations (i.e. community and building-level heat exchange stations) are usually located in communities and new or reconstructed community heat exchange stations are usually located in independent buildings; the building-level thermal stations are usually located in the basement with a capacity smaller than community thermal stations. Noises during the operation stage mainly come from the water circulation pumps (with a noise strength of approximately 78dB(A)) and water replenishment pumps (with a noise strength of approximately 85dB(A)). The discharge noise may be deemed as point sources at a certain distance. Model calculation shows that, with noise isolation or vibration absorption measures taken, together with the sound isolation function of building walls, noises of water pump outside the heat exchange stations are significantly reduced in terms of strength. Calculation shows that noise outside the heat exchange station may be controlled at less than 50dB(A). Results of noise impact prediction reveal that the contribution value of the heat exchange station to the impacts on the surrounding acoustic environment meets the requirements for Category 2 mixed areas specified in Emission Standard for Environmental Noise at Boundary of Industrial Enterprises (GB12348-2008) and the maximum contribution value to the acoustic environment quality in the region is 10dB(A).

3. Prediction and analysis of noise of primary heating station of Xingtai Subproject during the operation stage

Noise prediction and evaluation for the primary heating station uses the maximum monitoring value in the local boundary noise data from the monitoring in July 2013 as the background value to predict the noise contribution value of the new noise sources to the boundary noise after the primary heating station is put into operation and analyze the impacts generated by the new noise sources.

(1) For new noise sources and source strength, please see **Table 5-7** for details.

Table 5–7 List of New Key Noise Sources and Source Strength

SN	Equipment description	Number (No.)	Level of generated noise dB(A)	Noise reduction action	Noise reduction effect
1	Heat source water circulation pump	8	85	Workshop sound insulation	Noise reduction: 15dB(A)
2	Hot water circulation pump	4	90	Workshop sound insulation	Noise reduction: 15dB(A)
3	Heat pump	17	80	Workshop sound insulation	Noise reduction: 15dB(A)
4	Water replenishment pump	2	70	Workshop sound insulation	Noise reduction: 15dB(A)
4	Water Condensation pump	4	70	Workshop sound insulation	Noise reduction: 15dB(A)

(2) Prediction model

The prediction model of predicting the contribution value of point sound source to boundary noise is used.

(3) Acoustic Environment Impact Assessment

Table 5-8 shows the contribution value and prediction value of noise of primary station to the surrounding boundary calculated based on the noise prediction model and in association with the distance from the noise sources to the various prediction points.

Table 5–8: List of Prediction Results of Contribution Value of Boundary Noise, Unit: dB(A)

Name of prediction point	Current value		Contribution value	Prediction value	
	Day	Night		Day	Night
East boundary	56.3	49.6	37.3	56.4	49.8
West boundary			43.5	56.5	50.6
South boundary			45.0	56.6	50.9
North boundary			46.9	56.8	51.5

It is known from **Table 5-8** that, after the primary station is put into operation, the noise contribution value of the noise sources to the plant boundary ranges from 37.3 to 46.9dB(A), satisfying the corresponding standard for Category 3 zones specified in the Environmental Noise Emission Standard for Boundaries of Industrial Enterprises". Superposed with the current value, the prediction value of boundary noise is 56.4 to 56.8dB(A) in daytime and 49.8 to 51.5dB(A) in nighttime, meeting the Class 3 standard specified in Acoustic Environment Quality Standard. In addition, the primary heating station has a distance of 320m to the closest sensitive site of Shixiang Village. Therefore, after distance attenuation, noise will not produce adverse impacts on acoustic environment of the surrounding residential communities.

(4) Prediction and analysis of noise of pressure isolation heat exchange station of Zhangjiakou Subproject during the operation stage

Noise strength of the water circulation pump and water replenishment pump in the pressure isolation heat exchange stations is respectively 78dB(A) and 85dB(A). It is predicted that outdoor noise strength will be less than 55dB(A) if the noise reduction measures such as vibration absorption and noise shields are taken and building wall noise isolation is achieved. The heat exchange station is located 13.5m and 8.5m from the No. 3 Dormitory Building of China Unicom (north boundary) on the north and the dormitory building of No. 251 Hospital (west boundary) and 6m and 10m away from the east boundary and the south boundary. Therefore, the sound impact assessment of the operation stage of the pressure isolation heat exchange station aims to conclude whether the results of superposition of the boundary contribution value and the current monitoring value will meet the standard requirements.

Table 5-9 shows the contribution value and current monitoring value of noise sources to the plant boundary in the operation stage of the pressure isolation heat exchange station as well as the results of superposition with the current monitoring value.

Table 5–9: Prediction Results of Impacts of Noise Sources of the Pressure Isolation Station to the Plant Boundary

SN	Location	Contribution value	Current monitoring value(dB(A))		Superposed prediction value	
			Day	Night	Day	Night
1	East Boundary	40	59.3	48.2	59.4	48.8
2	North Boundary	33	52.1	44.1	52.2	44.4
3	West Boundary	37	54.2	43.7	54.3	44.5
4	South Boundary	35	59.1	48.3	59.1	48.5

It can be known from the prediction results in the above table that the noise sources of equipment of the pressure isolation heat exchange station during the operation stage as well as its superposition value with the current monitoring value of east boundary and south boundary satisfy Class 2 standard limits specified in Environmental Noise Emission Standard for Industrial Enterprise Boundary, i.e. 60dB(A) for daytime and 50dB(A) for nighttime. The results of superposition of the equipment noise of the pressure isolation heat exchange station and the

current monitoring values of the North Boundary (China Unicom No. 3 dormitory building) and the West Boundary (No. 252 Hospital dormitory building) satisfies Class 2 standard limits specified in Environmental Noise Emission Standard for Industrial Enterprise Boundary (GB12348-2008). Therefore, the impacts produced by equipment noise of the pressure isolation heat exchange station on China Unicom No. 3 building outside the north boundary and No. 251 Hospital dormitory building outside west boundary are minimal.

5. Prediction and analysis of noise of boiler fuel coal-to-gas conversion of Zhangjiakou Subproject during the operation stage

The key noise sources in the operation stage of the boiler fuel coal-to-gas conversion of Zhangjiakou Dongyuan Heating Co., Ltd. are the gas-fired boilers and their blowers with a noise strength of 73(A) and 83dB(A). Such equipment is located indoors. The existing boiler houses adopt the brick and concrete framework structure with a noise reduction effect of around 25dB(A). After isolation by the walls, it is predicted that noise strength outside the workshops will be reduced to 53dB(A) or less. The closest sensitive targets outside the heat source are Dongluyuan Residential Community and individual residents of Qiaodong District, which are respectively 120m and 80m from the boiler house. After distance attenuation, noise of the boiler house will produce very minor impact on both targets.

5.4.2 Mitigation Measures of Noise Impacts

5.4.2.1 Mitigation measures of noise impacts during the construction stage

1. Mitigation measures of noise impacts during the construction stage of pipe network

Construction activities of the heating pipe network are mainly carried out in the urban area. Therefore, it is necessary to take effective measures to reduce noise impacts:

1) Low-noise equipment should be selected; for high-strength noise operation lasting for a relatively long period of time, noise isolation fences should be provided around the construction site;

2) Construction activities should be located reasonably and high-noise construction equipment should be concentrated away from sensitive objectives, and should be operated inside sheds when possible to minimize noise.;

3) The mechanical equipment should be maintained and serviced on a periodical basis to assure normal and stable operation and avoid noise pollution caused by equipment in poor operation;

4) Scientific construction scheduling should be developed to avoid high noise equipment operation at the same time and strictly control the working periods of high-noise plants. Operations should be restricted at specified time period (12:00 to 14:00 in daytime and 22:00 to 6:00 the next day in nighttime);

5) Concrete mixers are not allowed on construction site, instead commercial concrete shall be purchased;

6) The transportation routes of trucks transporting materials, earth and stone, and construction wastes should avoid concentrated residential areas and sensitive periods (22:00 to 6:00 the next day) where and when possible. Transportation trucks arriving at and departing from sites should slow down and should not sound the horn. The construction companies should make sure that the transportation trucks have good technical performance, securely fastened parts and are free from braking screeches.

7) Dedicated staff should be designated for maintenance of construction machinery following feasible and practical procedure. Regular training should be provided to site workers to avoid accidental noise;

8) In accordance with the PRC Environmental Noise Pollution Control Law, the contractor should report to local environmental authority on project name, construction location and duration, potential noise level and mitigation measures to be taken 15 days before commencement of construction.

2. Mitigation measures of noise impacts during the construction stage of primary heating station in Xingtai Subproject

The following mitigation measures should be taken to reduce noise impacts:

1) The construction companies should use low-noise mechanical equipment and designated a dedicated personnel for periodical maintenance and servicing of equipment and providing training to site workers to use the various mechanical equipment in strict accordance with the codes of operation;

2) The distance attenuation measures should be utilized, with the strong-noise equipment located in a decentralized way where no adverse impacts will be on the construction activities. The fixed mechanical equipment should be operated inside sheds where possible;

3) During the construction stage of earth and stonework and building structure, fences should be set up outside the buildings to reduce impacts by construction noise on the external environment;

4) The entrances and exits of construction vehicles on site should be located as far away from the residential areas as possible and vehicles travelling by residential areas should travel in slow speed and should not sound the horn.

3. Mitigation measures of noise impacts during the construction stage of pressure isolation heat exchange station in Zhangjiakou Subproject

The pressure isolation heat exchange station is adjacent to China Unicom No. 3 dormitory building to its north and No. 251 Hospital dormitory building to its west. Measures should be taken to reduce noise impacts during the construction stage of the pressure isolation heat exchange station:

1) Advanced low-noise equipment should be selected for the construction activities and periodical maintenance should be assured to keep the equipment well lubricated and avoid increase of mechanical noises due to poor equipment performance so as to reduce the level of impacts on environmentally sensitive targets. Construction material transportation vehicles should be maintained periodically, and slow down and sound no horn when travelling by residential areas, schools and other sensitive sites;

2) Boundary fencing walls with a height of 2.2m should be constructed before construction commences;

3) When power generators and other high-noise equipment are used, local fencing may be achieved using fixed or mobile noise shields or barriers;

4) Knocking and other artificial noises should be minimized upon dismantling of fences and racks or loading and unloading of materials or wastes;

5) Idle equipment should be shut off immediately;

6) In accordance with the PRC Environmental Noise Pollution Control Law, the contractor should report to local environmental authority on project name, construction location and duration, potential noise level and mitigation measures to be taken 15 days before commencement of construction.

5.4.2.2 Mitigation measures of noise impacts on special sensitive targets during the construction stage

During construction around schools, hospitals, as well as residential buildings and offices identified as special sensitive targets, the following tailored mitigation measures should be taken and strengthened to reduce noise impacts during construction:

1) Noise isolation fences with a height of no less than 3m should be provided. When necessary, the operation area should be fenced up and enclosed;

2) Knocking and other artificial noises should be minimized upon dismantling of fences and racks or loading and unloading of materials or wastes;

3) During construction around schools, the contractor should consult with school and try to arrange high-noise construction during weekends or after school. At the same time the construction progress should be sped up to shorten construction time. Construction activities are banned during exams.

4) Before construction commences around residential buildings identified as special sensitive targets, the construction companies should communicate with the concerned residential committees and give notice to residents via the residential committees of the construction schedule. Advertisements should be posted at entrances and exits of residential buildings to notify the residents of points of attention during the construction activities.

5) During construction, qualified monitoring institute should be hired for noise monitoring, and construction activities shall be stopped when noise level cannot meet applicable standard. Construction cannot be resumed until monitoring results indicate compliance after construction activities have been improved;

6) For special road section that requires continuous construction, consultation with nearby institutions should be done and approval should be obtained. Public notice should be made before construction.

5.4.2.3 Mitigation measures of noise impacts during the operation stage

1. Mitigation measures of noise impacts during the operation stage of heat exchange station

During the operation stage, the key noise sources of the heat exchange station are the water circulation pump and the water replenishment pump. In order to reduce noise strength, various noise reduction measures have been considered in the design stage. Therefore, the key mission in the operation stage is to make sure such measures identified in the design stage are enforced. These measures are: (a) low noise equipment should be selected with regular maintenance to ensure stable operation; (b) upon installation of water pumps, the inlet and outlet pipes of the pumps should be equipped with vibration-absorbing pumps and vibration-absorption actions must be taken for the pump foundation and noise isolation hoods installed to reduce noise; (c) sound insulation doors and double sound insulation windows should be used for heat exchange stations; and (d) sound insulation structure should be adopted for heat exchange stations.(e) equipment in the new heating stations are arranged reasonably.

2. Mitigation measures of noise impacts during the operation stage of primary heating station of Xingtai Subproject

The key noise sources in the operation stage of the primary heating station of Xingtai Subproject include the heat source water circulation pump, hot water circulation pump, heat pump, water condensation pump and other equipment in the station, with a noise level of approximately 70dB(A) to 90dB(A). In the design stage, selection of low-noise equipment has been considered and it should be made sure that the noise-generating equipment is located inside the workshops to achieve a noise reduction of 15dB(A) or more so as to minimize noise impacts on the surrounding environment.

3. Mitigation measures of noise impacts during the operation stage of pressure isolation heat exchange station of Zhangjiakou Subproject

During the operation stage, the key noise sources of the pressure isolation heat exchange station of Zhangjiakou Subproject are the water circulation pump and the water replenishment pump. In order to reduce noise strength, the various noise reduction measures have been considered in the design stage. Therefore, the key task in the operation stage is to make sure the measures identified in the design stage are enforced. These measures are: (a) low noise equipment should be selected with regular maintenance to ensure stable operation; (b) upon installation of water pumps, the inlet and outlet pipes of the pumps should be equipped with vibration-absorbing pumps and vibration-absorption actions must be taken for the pump foundation and noise isolation hoods installed to reduce noise; (c) sound insulation doors and double sound insulation windows should be selected in the design; and (d) the equipment are arranged in a reasonable way to locate the high-noise equipment adjacent to Yangjiafen North Road and away from the special sensitive targets on the north and west sides.

5.5 Prediction and Evaluation and Mitigation Measures of Surface Water Environment Impacts

5.5.1 Status Evaluation of Surface Water Environment

Local environment monitoring indicates that the surface water environment quality status in the four subproject cities / counties except Xingtai satisfies the water quality requirements specified in the local water function zone planning. In Xingtai, the major surface water bodies, except Qili River, fail to satisfy the water quality requirements specified in the local water function zone planning. Causes of poor surface water quality include: 1) due to lack of natural runoffs. Rivers in Xingtai are seasonal rivers; 2) these rivers are accepting excessive amount of domestic sewage and industrial wastewater. The key pollutants in these poor-quality rivers include COD, ammonia, and TP, etc.

5.5.2 Evaluation and Analysis of Surface Water Environment Impacts

1. Prediction and evaluation of surface water impacts during the construction stage

No river crossing is involved during the construction of the Project. There is no temporary living quarter on the pipe network construction sites. Therefore, domestic sewage generated by the construction workers is discharged from their original living sites into the municipal sewage system. Pipeline residual water and pressure test water possibly generated during pipeline construction and renovation are also discharged into the closest municipal sewage system and not discharged directly into the surface waters. WWTPs have been built at the end of the local municipal sewage system of each subproject city / county. With effective engineering measures applied, this Project will only generate little wastewater (Pipeline residual water and pressure test water, as well as very small amount of domestic wastewater and muddy water) during construction stage. All will be discharged to the municipal sewers and there will be surface runoff. As no wastewater will be discharged to water bodies, there will be no adverse impacts on surface water.

2. Prediction and evaluation of surface water impacts during the operation stage

Drainage in the operation stage mainly includes wastewater discharged from the softened water production system of the heat exchange station. Such drainage is very small in volume. During the construction of heat exchange station (including heat supply primary station and pressure isolation heat exchange station), engineering measures have been taken to ensure any wastewater generated will be discharged into the municipal sewage system. There will be no surface runoff. Thus there will be no impacts on surface water bodies.

5.5.3 Protection Measures of Surface Water Environment Impacts during Construction Stage and Operation Stage

1. Protection measures of surface water environment impacts during construction stage

A) During construction, public toilets (facilities) shall be made used of whereas possible. If there is no public sanitation facility nearby, temporary mobile toilets should be set up at construction site. Random discharge should be prohibited;

B) Sedimentation tank should be set up. Construction muddy water should be treated by sedimentation tank for reuse;

C) Pipeline residual water should be discharged at inlet of municipal sewer. When testing the pipe pressure, the outlet should be placed at the inlet of municipal sewer for discharging pressure test water;

D) Special drainage channels should be set up at construction site, so that the small amount of construction sewage can be discharged into the nearest municipal sewer, instead of being surface runoff;

E) Gravel, cement and other materials piled up at the construction site should be covered when raining, so as to avoid runoff caused by rainfall from polluting the surrounding natural water bodies.

2. Protection measures of surface water environment impacts during operation stage

A small amount wastewater will be generated from the demineralized water system of the heat exchange station during the operation stage. Engineering measures have been applied in the construction stage of the heat transfer station to ensure any wastewater during operation will be directly discharged into the municipal sewer system. There will be no surface runoff. Therefore, there will be no impact on surface water environment and no other mitigation measures need to be taken.

5.6 Prediction and Evaluation and Mitigation Measures of Ground Water Environment Impacts

5.6.1 Status Evaluation of Ground Water Environment

Based on results of ground water monitoring in the project implementation area of each subproject, ground water in most of the places has a relatively big depth and is of excellent water quality satisfying the water quality requirements of Class III or higher specified in the ground water quality standard.

5.6.2. Prediction and Evaluation of Impacts on Ground Water

1. Prediction and evaluation of impacts on ground water in the construction stage

The Project construction activities, in particular pipe network construction activities, are located at a substantial distance from the shallowest point of ground water. As engineering measures have been taken to assure the small volume of drainage in the construction stage is discharged into the municipal sewage system instead of the surface soil, the Project construction will produce no adverse impacts on ground water.

2. Prediction and evaluation of impacts on ground water in the operation stage

Wastewater generated during operation will be discharged into municipal sewers or WWTP. Wastewater will not enter surface soil. Therefore, groundwater will not be affected during operation.

5.6.3 Protection Measures of Ground Water

Regarding the small volume of drainage generated in the construction stage and operation stage of the Project, engineering measures have been implemented to assure that such drainage is discharged into the municipal sewage system or designated WWTP instead of surface water bodies. Therefore, no direct impacts will be generated upon the ground water environment and no other protection measures are required.

5.7 Evaluation and Mitigation Measures of Solid Waste Impacts

5.7.1 Impact Analysis

1. Analysis of solid waste impacts during the construction stage

Site investigation shows that the small volume of solid wastes generated in the construction stage are construction wastes and ordinary wastes, and no hazardous wastes are involved. In the construction stage, no domestic wastes are discharged from the construction areas where no domestic activity zones are provided. Solid wastes possibly generated in the construction stage include: 1) small volume of construction wastes (including debris), discarded soil, etc.; 2) dismantled waste and used metal parts, waste insulation materials, etc.

Potential environmental impacts of solid wastes in the construction stage are of short duration and small extent and may disappear after the end of construction stage. With the mitigation measures taken, the impacts of the solid wastes in the construction stage on the surrounding environment will be very minimal.

2. Analysis of solid waste impacts during the operation stage

Substantially no solid wastes are discharged in the operation stage, thus producing no impacts on the surrounding environment and sanitation and social activities.

5.7.2 Mitigation Measures of Solid Waste Impacts

1. Mitigation measures of solid waste impacts during the construction stage

1) Construction waste should be transported to disposal site designated by urban administration agency. Random dumping, set up of dumping site, sale or receipt of construction waste should be prohibited.

2) Spoil should all be used for backfill;

3) Temporary earth stockpiles should be set up for each section of pipeline construction and located within the construction red lines and fenced up with earth-filled straw bags. Periodical water spraying is required. The stockpiles should be covered in case of windy or rainy weather.

4) Vehicles transporting construction debris should travel along designated routes, at designated time and to designated places. The transportation vehicles should be loaded to an appropriate volume and be enclosed, packed, and covered to prevent spillage and leakage;

5) Waste metal parts, equipment spare parts and insulation material, except for recycled, should be transported to designated disposal site in accordance with general industrial waste disposal requirements.

2. Mitigation measures of solid waste impacts during the operation stage

Substantially no solid wastes are discharged in the operation stage, thus no additional mitigation measure is needed.

5.8 Prediction and Evaluation and Mitigation Measures of Ecological Environment Impacts

5.8.1. Analysis of Ecological Environment Impacts

Due to pipeline excavation and backfill and other activities in the construction stage of the Project, some adverse impacts may be generated to the urban environment. These impacts will disappear as the construction ends and the operation stage begins. The detailed analysis is as follows:

1. Impacts on ecological environment

The construction areas of the Project are located in the urban area or on the city outskirt, involving no agricultural land, no changes of local land use functions, and no changes to regional landform and no forest land occupation. Around the construction areas, there are no ecologically sensitive areas. Therefore, the construction of the Project will not generate impacts on the ecological environment in the neighborhood.

2. Impacts of soil erosion

During the construction stage of the Project, soil erosion impacts of an extremely small scale will possibly arise. There will be no soil erosion after the Project completes.

3. Impacts on soil environment

The construction activities will produce some minor local impacts on the soil structure and physical properties of the construction area. Impacts generated by excavation and backfill on soil environment quality are extremely minor.

4. Vegetation impacts

Ground surface construction will produce adverse impacts on landscaping and a small volume of vegetation on urban roads. However, such impacts will disappear as the construction activities end. Therefore, such impacts may be mitigated through restoration of original vegetation so as to make sure that no adverse impacts will be generated by the construction of the Project on the regional ecological environment.

5.8.2 Measures of Ecological Environment Protection and Impact Mitigation

Adverse impacts likely to be generated on the ecological environment will be reduced through engineering and preventive measures and strengthened temporary protection and management of ecological environment. The specific measures include:

1) Natural topography should be fully considered. The temporary excavation area, the destruction of vegetation, and the occupation of road green space should be reduced. Better earth balance should be achieved to minimize earth excavation and backfilling. Excavation and backfill by layer should be adopted to protect surface soil;

2) Excavation for Pipeline construction should be done section by section, and backfill and vegetation restoration should immediately after pipeline laying is completed；

3) On-site mixing of construction materials should be reduced to reduce possible impacts on soil quality;

4) Waste soil should be disposed of properly and comprehensively utilized to prevent soil erosion;

5) Design requirements should be strictly followed for construction along the road. Retaining measures should be taken for area that is prone to erosion to minimize affected area;

6) Waste soil generated from excavation should be stockpiled in a centralized way and excavation and backfill operations should be carried out simultaneously if possible to

minimize waste soil stockpiling and reduce soil erosion;

7) Temporary soil stockpiles in the course of construction should be fenced up with bagged soil and properly covered;

8) Paths for construction vehicles should be strictly designed and built；

9) Re-planting should be done right after construction to restore original land use；

10) The ecological environment supervision system should be established for the construction stage to assure implementation of the various measures.

5.9 Impact Evaluation and Protection Measures of Social Environment

5.9.1 Social Impact Analysis

1. Social impact analysis in the construction stage

Social impacts in the construction stage are diversified, specifically including:

1) Impacts on local traffic: During pipeline construction, pavement excavation is needed. In the course of excavation, it is necessary to enclose the road sections around the construction area and reduce the number of lanes, thus affecting local normal traffic. In the same time, traffic will increase due to the additional construction vehicles. However, since there are not many such additional vehicles, the impacts on traffic flow along the roads should be very minor.

Based on the results of investigations and interviews during the project preparation stage, some key roads and important intersections have been identified for each subproject as the special sensitive targets of traffic impacts. There are totally 19 such targets as shown in **Table 5-10**.

Table 5-10 Key Roads and Important Intersections Involving Traffic Impacts

Special sensitive targets	Chengde	Pingshan	Xingtai	Zhangjiakou
Key roads and important intersections involving traffic impacts in the construction stage	Xiayingfang Section of Guangren Street (West Street)	Dianchang Road (urban section of Provincial Highway S301); intersection of Hexi Street and Xibaipo West Road; intersection of Xianbiao North Street and Xibaipo East Road	Provincial Highway S221; Intersections: Xingzhou Avenue – Xiangdu Road, Xingzhou Avenue – Kaiyuan Road, Xingzhou Avenue – National Highway 107, Yejin Road –Quanbei Street, Renmin Street, Yurangqiao Road, Xingda Road – Lianchi Street, Kaiyuan Road – Quanbei Street, Kaiyuan Road – Quannan Street, Xiangdu Road – Dongguan Street	Intersection between Shengli Mid Road –Shenghua West Street, Intersection between Shengli North Road and Jianguo Road and Hongqi South Road, Intersection between Shengli North Road and Jianguo East Road, Intersection between Shengli North Road and Wuyi Street, in front of Weihua Primary School
Quantity	1	3	10	5

2) Impacts on municipal facilities and railway and highway crossing: Pipeline construction may generate impacts on existing underground pipelines and cables such as water supply and drainage pipelines, electrical cables, fuel gas pipelines, communication cables, or on construction of heating pipelines. Table 5-10 lists the 19 important roads and intersections, all of which involve impacts on other municipal pipelines. In addition, pipeline crossing construction may also produce impacts on normal operation of railway and highway and, when serious, may impact traffic safety. Pingshan and Xingtai Subprojects involve totally 5

pipeline crossings of railways and highways as detailed in **Table 5-11**.

Table 5-11 Highways and Railways Involved in Pipeline Crossing Construction

Special sensitive target	Pingshan	Xingtai
Highway and railway involved in pipeline crossing construction	Gangcheng Section of Suo-Huang Railway; Power Plant section of Provincial Highway S301; intersection of Hexi Street and Xibaipo West Road; intersection of Xianbiao North Street and Xibaipo East Road	Xingtai Section of Beijing – Kowloon Railway
Quantity	4	1

3) Impacts on residents' daily life and business activities: Pipeline and heat exchange station construction will produce certain adverse impacts on normal travelling of residents and business activities in the surrounding. However, with a short duration in each construction section, the adverse impacts will not last very long and will disappear when the construction completes.

4) Impacts of migrant construction workers in the construction period: Throughout the construction process of the Project, a certain percentage of the construction workers will be migrant workers. If not properly managed, the migrant construction workers may produce certain adverse impacts on local society and life. The possible circumstances may include conflict of interest between migrant workers and local residents, illegal activities, increased opportunities of disease propagation. The arrival of migrant construction workers will certainly drive the prosperity of local market and the increase of local consumption.

5) Impacts on public facilities and services: Construction may impact the work of the local public service agencies and their staff. Migrant workers may increase the pressure on local cultural and business facilities and service, but also bring certain business opportunities to the corresponding service agencies. In a word, due to the short construction period and very small number of migrant workers, the impacts on public facilities and services are also very small. At the end of the construction activities, these impacts will disappear very quickly and they are temporary.

6) Impacts on city tourism: Construction along special sensitive road sections may also bring certain impacts on tourists' routes of entering and leaving the scenic spots. This impact only exists in Chengde City. Xiayingfang Section of Guangren Street (West Street) in Chengde is one of the key routes to Chengde Summer Resort. Construction in this road section will affect tourist vehicles and increase the pressure on the other access roads or reduce the number of tourists. As Xiayingfang Section of Guangren Street (West Street) in Chengde is not the only route to Chengde Summer Resort, the degree of such impacts is controllable and such impact will disappear immediately as the construction ends because it only occurs in the construction stage.

2. Social impact analysis in the operation stage

Upon the completion and operation of the Project, the following social impacts may be generated:

1) Construction of the Project will increase the district heating area provided by the heating enterprise and facilitate improvement of local air environment and realization of energy conservation and emission reduction objectives;

2) Construction of the Project will enable the heating enterprises to cut heating cost and increase market competitiveness;

3) Construction of the Project will drive local business and trade and economic growth;

4) Construction of the Project will improve heating conditions and living quality of local residents;

5) Construction of the Project will improve heating stability and help decreasing disease occurrences and improve the level of residents' health protection and disease prevention;

6) Construction of the Project will take full account of the actual needs of the aged, disabled, children, and low-income households and provide supports to vulnerable groups;

7) Construction of the Project will help increasing employment;

8) Construction of the Project will help reducing housework and heating expenditure of local residents and drive women development;

9) Construction of the Project will facilitate the improvement of urban infrastructure and services.

5.9.2 Social Impact Mitigation and Protection Measures

1. Social impact mitigation and protection measures in the construction stage

During the construction stage, efforts should be made to assure proper implementation and enforcement of the following protection and mitigation measures:

1) Careful preparation should be done before construction. Construction program should be confirmed with relevant agencies and emergency-response program should be in place to avoid disturbance to daily life of the residents；

2) Relevant power departments should be consulted in advance to confirm power use plan. In the area with insufficient power capacity, expansion should be done in advance to prevent temporary power failure and disturb daily life of the residents and business along the pipeline；

3) The construction companies should delegate a special personnel to be responsible for communicating with the communities, schools, hospitals and other institutions in the construction area and, if needed, ask them to help solve problems arising during construction and avoid abnormal disturbances over the construction activities;

4) The public should be notified of traffic control plans during the construction period by TV, newspaper, radio and other media or mobile information bulletin boards; where diversion of bus lines or relocation of bus stations are involved, advertisements should be posted in buses and at stations and, in the meanwhile, hotlines should be opened in the bus companies with designated persons arranged to answer questions and give advices.

5) Billboards should be placed at the construction site indicating main contents of the project, construction time, contact person and hotline to obtain public understanding of the inconvenience caused by construction activities;

6) Height and direction of the construction lamp shall be considered not to affect residents during night；

7) Warning signs and traffic guiding signs should posted in affected area in accordance with relevant requirements.

2. Mitigation measures of social impacts on special sensitive targets during the construction stage

The following specific measures should be taken and strengthened over the identified key roads and important intersections, railways and highways and schools and other special sensitive targets so as to eliminate or reduce adverse social impacts:

1) Prior to construction, the construction companies should communicate with local traffic authority and make traffic arrangements during the construction stage, including adjustment of traffic routes, timing, traffic limit actions; prior notice should be given to the public by TV, radio and newspapers;

2) For the key roads and intersections, the construction companies should assign special personnel to assist traffic management in peak hours to assure smooth and orderly traffic;

3) The construction company responsible for the construction activities along Xiayingfang Section of Guangren Street (West Street) in Chengde should communicate and coordinate with local traffic management and tourism authorities prior to construction and make reasonable construction plans to avoid, where possible, the Labor Day Holiday, the National Day Holiday, and summer tourist season in July and August. Stronger efforts of traffic dispersion should be made when necessary.

4) The exterior surfaces of the temporary fences and sound barriers on construction sites should have colors and patterns best consistent with local cultural relics and scenery.

5) Construction activities around schools and kindergartens should be arranged in summer vocation with priority. If inevitable, construction optimization actions should be taken to reduce construction duration at school gates. When student access roads are involved in the construction activities, secure and safe temporary access bridges or bypasses should be set up;

6) Construction materials should be stored at designated sites located far away from schools, with separation zones and warning signs provided;

7) Pipeline construction companies responsible for construction activities at the 19 important roads and intersections listed in Table 5-10 should figure out the direction and layout of the existing pipelines and cables of water supply and drainage, electricity, fuel gas and communication under the ground before construction and communicate in a closer manner with the concerned authorities (enterprises) to avoid possible damages and adverse disturbances caused by construction;

8) Construction companies responsible for the construction activities of the 5 railway and highway crossings listed in Table 5-11 should communicate with the railway and highway authorities prior to construction to develop safe construction programs. When needed, these authorities may be asked to help the construction companies to solve problems and assure smooth implementation of the construction activities.

3. Social impact mitigation and social environment protection measures during the operation stage

During the operation stage, the project operation agency should strengthen training of service staff to provide more convenient and preferential services to the vulnerable groups, including the aged, the disabled, women, and poor households. In addition, public participation activities should be organized based on the requirements of public participation plan to improve service quality and construction of heating service system.

5.10 Analysis of Impacts on Cultural Relics Protection Units

No cultural relics protection units and cultural relics, ancient and famous trees, geological relics, fold custom relics and other physical and cultural resources are involved within the scope of construction impacts of the Project.

In the urban center of Chengde, there is the national key cultural relic protection unit of “Chengde Summer Resort and its Eight Outer Temples” (which is also included in the World

Cultural Heritage Catalog by UNESCO). Based on the results of site investigation and the survey in the preparation stage, the construction areas of the pipelines and heat exchange stations under Chengde Subproject are outside the scope of protection of “Chengde Summer Resort and its Eight Outer Temples” and far away from the cultural relics. The construction activities will not cause damages and impacts on the physical and cultural resources of these cultural relics protection units.

For the two construction sites located relatively nearer to the scope of protection of the cultural relics protection unit, additional risk prevention and landscaping measures are required to avoid unexpected incidents and risks of impacts and better accommodate the needs of tourism and landscaping. These two construction sites are: 1) Puning Primary School Heat Exchange Station located 230m away from the boundary of Puning Temple protection zone; 2) No. 6 Middle School Heat Exchange Station located 290m from the boundary of the protection zone of Mi Fushou Temple. The relationship of location of both construction sites and the two cultural relics protection units is shown in **Figure 5-1** and **Figure 5-2**.

Figure 5-1 Location Map of the Construction Site of Puning Primary School and the Boundary of Puning Temple Protection Zone in Chengde

Figure 5-2 Location Map of the Construction Site of No 6 Middle School and the Boundary of Mi Fushou Temple Protection Zone in Chengde

Additional risk prevention and landscaping measures to be taken include:

1) Construction material storage site and temporary roads and transportation of materials and equipment must not be located in protected scope of cultural relics and must be located on the far side of such protection units.

2) The construction workers must not enter the protection scope of the cultural relics protection units and activities not beneficial to protection of cultural relics shall be banned;

3) Dust and noise barriers should be heightened in the side of construction site near cultural

relics to reduce adverse impact；

4) The exterior surfaces of the temporary fences and sound barriers on construction sites should have colors and patterns best consistent with local cultural relics and scenery and echoing, in appearance, with the history and style of a city.

5.11 Summary of Environmental Management Codes and Mitigation Measures

5.11.1 Environmental Management Documents

Two environmental management documents have been prepared for implementation by the PIUs during project implementation for better environmental performance, and they are:

1) Environmental Protection Codes for Heating Exchange Station Construction and Pipeline Laying

2) Environmental Management Plan for Small Boiler Demolition

1. Environmental Protection Codes for Heating Exchange Station Construction and Pipeline Laying

This document sets forth detailed requirements in terms of responsibilities and staffing of various parties, management assignments and procedure in different stages, measures to be taken, construction site management, air/water/noise pollution control, waste management, protection of ecology and cultural relics, as well as health and safety. Additionally, this document also includes Checklist of Site Inspection before Construction, Checklist of Construction Management, and Template of Environmental Management Improvement Notice. See **Annex A** of the Report for detail.

2. Environmental Management Plan for Small Boiler Demolition

This plan presents detailed requirements for environmental management measures for small boilers demolition. See **Annex B** of the Report for detail.

5.11.2 Summary of Environmental Impact Mitigation Measures

This section describes the mitigation measures of environmental impacts during the design and preparation stage, the construction stage, and operation stage, mitigation measures of environmental impacts on special sensitive targets, environmental management as well as environmental impact mitigation measures and requirements proposed in the due diligence report. **Section 12** Environment Management Plan summaries the mitigation measures of environmental risks for the PIUs to enforce and implement during the construction stage and the operation stage.

6 Analysis of Regional Cumulative Impacts

Cumulative impact refers to the continuous, incremental and/or collaborative impact arising from an action, a project or an activity, combining with other existing, planned and/or reasonably foreseeable future development activities.

In the initial stages of the EIA, the contents that may probably be contained in the Valued Environmental and Social Component (VECs) of the cumulative impacts are discussed, such as the public health, air quality, pollutant emissions, as well as the re-employment of laid-off workers and the increase of heating costs of Pingshan subproject, etc. after the closure of the small boilers. The most significant environmental impact of the proposed project is improved regional environmental air quality due to the expansion of district heat supply and the closure of small boilers.

According to the technical requirements for cumulative impact analysis, combining with the characteristics of the project, this cumulative assessment focuses on the project and the closure of small heating boilers, as well as the superposition analysis of the impact of ambient air imposed by the completed projects, projects under construction, and proposed projects involving the relevant air pollutant emission reduction in the four subproject regions. Taking into account the availability of basic data, this cumulative environmental assessment emphasizes the reduction of atmospheric pollutants, namely the analysis and evaluation of the emission reduction impacts of the SO2, NOx, dust and other air pollutants. In addition, the cumulative impact analysis also covers the cumulative impact of the project on the community, which is primarily the affected fireman due to the closure of small boilers.

Taking into account the tasks required in The Air Pollution Prevention and Control Action Plan (2013-2017), Implementation Plan of Air Pollution Control Action Program of Hebei Province (2013-2017), Cleaner Production Level Promotion Plan for Key Industrial Enterprises in Hebei Province (2013-2017) as well as the Air Pollution Prevention and Treatment Plan Implementation Rules as issued by the subproject cities and counties , the timeline for cumulative impact analysis are the year 2015 and 2017, which are consistent with the construction period of the project (2015-2017) and completion time (2017). Regional spatial analysis mainly focuses on the four subproject cities, while summarizingthe impacts in Hebei Province.

6.1 Analysis of Cumulative Ambient Air Impacts

6.1.1 Ambient Air Prevention and Pollutant Emissions Reduction Targets

Hebei is a typical province suffering pollution from coal burning. Major air pollutants are SO2, NOx, and particulates. Reducing air pollutant emission and improving ambient air quality has been the focus and objective of Hebei Province in air environment protection.

Before 2013, air pollution control in Hebei focused on treatment of air pollution sources and compliance with applicable standards, mainly aiming at industrial emission sources, coal burning facilities, and dust suspension from construction activities. The steel, electricity, cement, chemicals, and coal burning boilers are the industries prioritized for treatment. The major target pollutants include SO2, NOx, carbon monoxide, and particulate matters. Within the province 8,347 heavy-polluting enterprises were closed and 35,000 coal-fired boilers are eliminated or reformed in the year of 2013.

Hebei Province issued Implementation Plan of Air Pollution Control Action Program on September 12, 2013 to start a new round of air pollution prevention and treatment efforts. In accordance with the aforesaid document, Hebei will undertake 50 measures to solve the air pollution with fine particulate matters (PM2.5), emphasize the pollution treatment in the key cities, industries and enterprises, promote industrial upgrading and industrial equipment upgrading, and realize the district heat supply in the urban area. It is important to reduce emission of pollutants from the sources. As required in the plan, by 2017 the coal consumption

should be decreased by 40 million tons when compared with 2012 level, while the total emission of SO2, NOx, particulate matter, and volatile organic will decrease dramatically. The fine particulate matter concentration should be cut down by over 25%. As for theurban area of prefecture-level cities, coal fired boilers of 10t/h or below will be completely eliminated while that of 35t/h or below will be basically eliminated. The general objective is to realize significant improvement in the ambient air quality of the whole province. This round of air pollution prevention and treatment efforts concentrate mainly on the industrial enterprises with high energy consumption, severe pollutant emission, and low benefit, especially those small-scale enterprises in steel, cement, electricity and non-ferrous metal sectors. Meanwhile the enterprises that cannot be closed in spite of the severe pollution need technical reform and upgrading. Now such efforts are still in progress. Implementation of those measures greatly cuts down emission of SO2, NOx, CO and particulate matter. In 2014 the whole province reduced 15 million tons of iron production, 15 million tons of steel production, 39.18 million tons of cement production, and 15 million tons of coal consumption, eliminated and upgraded 39,600 coal fired boilers, and cut down average concentrations of SO2, NO2, CO, and particulate matter by 25.7%, 5.9%, 16.7%, and 12.6% respectively.

As required by Hebei Province, the four subproject cities/counties developed the annual and local prevention work programs of air pollution in 2013-2017, which defined the content of atmospheric treatment and control projects and atmospheric pollutants emission reduction targets.

The pollutant emissions reduction projects in Hebei Province and subproject cities/counties are now under implementation by taking the measures such as emission reductions in engineering, structure, and management, so as to achieve the emission reduction targets of SO2, NOx and dust as well as the objectives of atmospheric environmental quality improvement in 2017.

The air pollutant emission reduction targets for Hebei Province and subproject cities/counties in 2017 are summarized in **Table 6-1**. **Table 6-2** lists the introduction to the major emission reduction projects of air pollutants in the subproject cities/counties.

Table 6-1 Emission Reduction Targets for Hebei Province and Subproject Cities/Counties in 2017

Indicator	Hebei Province	Chengde	Pingshan	Xingtai	Zhangjiakou
Elimination coal-fired boilers and tea bathing furnace with capacity below 35 tons steam/hour	All	All	All	All	All
Reduction of coal (in standard coal) consumption (10,000 tons)	4000	120	290	250	390
SO_2 emission reduction (ton)	356000	9100	5000	5000	1400
NOx emission reduction (ton)	296400	7800	29700	32500	8000
Particulate matter emission reduction (ton)	93200	7500	2300	7500	600

Note: 1) the data in the table are sourcing from *The Air Pollution Prevention and Control Action Plan (2013-2017), Clean Production Level Promotion Plan for Key Industrial Enterprises in Hebei Province (2013-2017), Air Pollution Prevention and Treatment Plan Implementation Rules from* subproject municipalities and counties.

Table 6-2 Introduction to the Major Emission Reduction Projects of Air pollutants in the Subproject Cities/Counties

Project Type	Content and Quantity of the Project	Objective	Progress
Chengde			
Elimination of coal-fired industrial boilers	Closure of 25 sets of industrial boilers used for enterprise production in Chengde Livestock Factory, etc. (0.5-10 tons steam)	Reduction in coal consumption and air pollutant emissions	Expected to be completed by the end of 2015
Industrial sulfur dioxide treatment	Technological renovation projects of boilers, smoldering furnaces, kilns in 16 industrial production enterprises	Reduction in emissions of carbon dioxide	Expected to be completed by the

projects	including Chengde Xinglong County Xinglong Thermal Co., Ltd.		end of 2015
Industrial nitrogen oxide treatment projects	Technological renovation projects of boilers and generator sets in 6 industrial production enterprises including Gangue Thermal Power Plant of Chengde Kaixing Energy Co., Ltd.	Reduction in nitrogen oxide emissions	Expected to be completed by the end of 2015
Industrial dust control projects	Technological renovation projects on kilns, boilers, pulverizers, and other equipment in Chengde Xishangxi Cement Co., Ltd. and other 14 enterprises; cleaner production and utilization of clean coal in Jidong Cement Co., Ltd. and other 6 companies	Reduction in dust emissions	Expected to be completed bythe end of 2015
Closure of heating boilers	Closure and elimination of 222 sets of decentralized heating boilers and tea bath furnaces in Chengde Limin Almond Processing Co., Ltd. and other enterprises (0.5-10 tons steam)	Reduction in emissions of sulfur dioxide, nitrogen oxides, and particulate matter	Expected to be completed by the end of 2015
Chengde subproject	Elimination project of 6 sets of decentralized coal-fired heating boilers	Reduction in emissions of sulfur dioxide, nitrogen oxides, and particulate matter	Expected to be completed by 2017
Pingshan			
Renovation of coal-fired boilers	Renovation of chemical enterprises as well as the desulfurization, denitrification and dust removal equipment in coal-fired boilers and industrial furnaces Energy conservation renovation on 57 sets of coal-fired boilers as well as the change of fuel to natural gas in the whole county	Reduction in coal consumption and air pollutant emissions	Expected to be completed by the end of 2015 Expected to be completed by the end of 2017
Desulfurization /denitrification treatment and dust transformation of power plant boiler	Desulfurization, denitrification, and dust removal facilities renovation and upgrading for emission limits in Xibaipo Electricity Generating Co., Ltd.	Reduction in air pollutant emissions	Expected to be completed by the end of 2015
Desulfurization and dust control of steel and foundry industries	Desulfurization and dust control renovation for sintering machines in steel and foundry companies; execute the particulate matter emission limits (40 mg. M3)	Reduction in emissions of sulfur dioxide and particulate matter	Expected to be completed by the July of 2015
Dust remediation project for mines, construction sites, and roads	Measures for dust reduction shall be adopted for all major roads and dregs transportation in 24 surface mines and county town, as well as all construction sites of the county town	Reduction in emissions of particulate matter	All works expected to be completed by 2017
Xingtai			
Low-emission renovation for power sectors	Low-emission technological renovation project for the facilities in 8 power generation enterprises including Xingtai Guotai Power Generation Co., Ltd.	Reduction in air pollutant emissions	Expected to be completed by the end of 2015
Steel industry control project	Blast furnace desulfurization and dust transformation and sintering machine dust renovation project in 4 iron and steel enterprise including Xingtai Steel & Iron Co., Ltd.	Reduction in emissions of sulfur dioxide and particulate matter	Completed during 2013-2015
Cement industrial enterprise treatment and renovation	Production line denitrification and dedusting technological renovation projects in 9 enterprises such as Hebei Jinlong Cement Co., Ltd.	Reduction in emissions of nitrogen oxides and particulate matter	Expected to be completed by the end of 2015
Treatment and renovation of glass industry enterprises	Desulfurization, denitrification, and dust removal technological renovation projects in the production equipment of 17 enterprises such as Hebei Zhengda Glass Co., Ltd.	Reduction in emissions of sulfur dioxide, nitrogen oxides, and particulate matter	Expected to be completed by the end of 2015
Coking industrial enterprises dust treatment and renovation project	Desulfurization, denitrification, and dust removal technological renovation projects in the production equipment of 5 enterprises such as Hebei Zhongmei Xuyang Chemical Co., Ltd.	Reduction of emissions of sulfur dioxide, nitrogen oxides and particulate matter	Completed in 2013-2015
Coal-fired industrial	Emissions treatment and renovation projects in industrial	Reduction in coal	Expected to be

boiler emissions treatment projects	boilers of 28 enterprises including Hebei Gasification Co., Ltd.	consumption and air pollutant emissions	completed by September of 2015
Xingtai subproject	Closure and elimination of 40 sets of decentralized heating boilers	Reduction in emissions of sulfur dioxide, nitrogen oxides, and particulate matter	Expected to be completed by 2017
Zhangjiakou			
Closure of heating boilers	Closure and elimination of decentralized heating boilers and tea bathing furnaces in the 37 units including Hebei Institute of Architecture and Civil Engineering (35 tons steam and below)	Reduction in emissions of sulfur dioxide, nitrogen oxides and particulate matter	Expected to be completed by the end of 2014
Desulfurization and dust treatment project in power sector	Desulphurization facilities upgrading project of 11 power generation and thermoelectric enterprises including Zhangjiakou Power Plant of Datang International Power Generation Co., Ltd.	Reduction in emissions of sulfur dioxide and particulate matter	Expected to be completed by the end of 2014
Desulfurization treatment project of sintering machines in iron and steel enterprises	Sintering machine desulfurization renovation project in 2 steel & iron enterprises such as Zhangjiakou Xinye Machinery Manufacturing Co., Ltd.	Reduction in emissions of sulfur dioxide	Expected to be completed by the end of 2015
Coal-fired boiler desulphurization and dust control project	21 coal-fired boiler desulfurization treatment projects in Zhangjiakou Donghuan Heat Supply Center Co., Ltd.	Reduction in emissions of sulfur dioxide and particulate matter	Expected to be completed by the end of 2015
Dust control of construction sites and roads	Measures for dust reduction shall be adopted for roads in downtown, dregs transportation and construction sites.	Reduction in emissions of particulate matter	All works completed in 2013-2017
Zhangjiakou subproject	Closure and elimination of 158 sets of decentralized coal-fired heating boilers	Reduction in emissions of sulfur dioxide, nitrogen oxides and particulate matter	Expected to be completed by 2017

6.1.2 Analysis of Cumulative Impacts

1. Analysis of Emission Reduction of the Project

The actual air pollutant emission reduction of the proposed project will be mainly contributed by decreased coal consumption through elimination of small boilers. The calculation of emission reduction is carried out as per the Practical Data Manual for Environmental Protection issued by the environmental protection authority taking into account ash content and sulfur content in local coal, and it takes into consideration the efficiency of purification equipment possibly adopted by the small boilers.

There is no coal consumption reduction in Pingshan subproject, without associated small coal boiler elimination. The additional heat source is residual heat from Pingshan Power Plant, thus there is no emission reduction in this subproject. It mainly makes benefit by improving the residual heat utilization efficiency.

The project has already mobilized for construction (some components Xingtai and Zhangjiakou subprojects require earlier commencement), and the elimination of the scattered small coal-fired heating boilers associated with the Chengde, Xingtai and Zhangjiakou are also expected to carry out. By then, a total of 204 sets of small boilers will be closed. The project can realize in total the reduction of SO2 by 78.76 tons, NOx by 1,692.60 tons, particulate matter by 25.68 tons, and coal consumption by 242,800 tons. The details are shown in **Table 6-3**.

Table 6-3 Atmospheric Pollutants Emission Reductions of Closed Small Boilers

Indicator	Emission Reduction and Number of Small Boilers Closed

	Chengde Subproject	Xingtai Subproject	Zhangjiakou Subproject
Elimination coal-fired boilers and tea bathing furnace with capacity below 35 tons steam/hour	6	40	158
Reduction of coal (in standard coal) consumption (10,000 tons)	0.41	0	23.87
SO_2 emission reduction (ton)	49.25	2.83	26.68
NOx emission reduction (ton)	24.63	17.82	1650.15
Particulate matter emission reduction (ton)	16.99	0	8.69

Note: 1) The small boilers eliminated in Xingtai are gas-fired boilers, ground source heat pump or central air-conditioning. Particulate matter emission is nearly zero as no coal would be used as fuel; 2) After the elimination of 158 small boilers in Zhangjiakou, the emission reduction can realize 54,700 tons for coal (in standard coal), 6.04 tons for SO_2, 492.3 tons for NOx, and 11.03 tons for particulate matter. The four large-scale heating boilers in Zhangjiakou Dongyuan Thermal Company will be stopped, and rehabilitated to 2 gas-fired boilers for heating supply (taking into account denitrification and desulfurization of the purification facilities). Through such means, the reduced emission can realize 184,000 tons for coal (in standard coal), 20.64 tons for SO_2, 1,157.85 tons for NOx, and -2.34 tons for particulate matter. The figure in the table means the sum of those two parts.

2. Analysis of Cumulative Social Impacts

The elimination of 204 sets of scattered small coal-fired heating boilers which are associated with the project may reduce the emission of SO2 by 78.76 tons, NOx by 1,692.60 tons, particulate matter by 25.68 tons, and coal consumption by 242,800 tons, accounting for 0.02%, 0.57%, 0.03% and 0.61%, respectively of the emission reduction targets as specified in Implementation Plan of Air Pollution Control Action Program of Hebei Province (2013-2017). The emission reductions of SO2, NOx and particulate matter of each subproject account for 0.06% - 1.91%, 0.06%-20.631% and 0.23%-1.451% of the emission reduction targets stipulated in the Air Pollution Prevention and Treatment Plan Implementation Rules of subproject municipalities. The emission reductions, as a whole, realized in this project occupy a tiny proportion in Hebei Province, and even the subproject city's emission reduction targets. However, as a part of the emision reduction plan, these will make positive contributions to the ambient air improvement for Hebei Province and subproject municipalities.

The subprojects which have been implemented, under implementation and determined to be implemented in 2017 in subproject municipalities (including the Project) as well as other management measures, industrial structure adjustment measures, would allow the achievement of atmospheric pollutants emission reduction target in the subproject cities, thereby making a lasting and essentiale positive contribution to the improvement of atmospheric environment quality in the subproject cities, Hebei Province and even the Beijing-Tianjin-Hebei region.

See **Table 6-4** and **Table 6-5** for the detailed main air pollutants emission reduction targets and contribution of the project.

Table 6-4 Contribution of the Project to the Emission Reduction Targets of Hebei Province

Indicator	Expected Emission Reduction	Emission Reduction to Be Achieved by Subproject	Contribution to the Target of Hebei Province (%)
Reduction of coal (in standard coal) consumption (10,000 tons)	4000	24.28	0.61
SO_2 emission reduction (ton)	356000	78.76	0.02
NOx emission reduction (ton)	296400	1692.6	0.57
Particulate matter emission reduction (ton)	93200	25.68	0.03

Table 6-5 Expected Emission Reduction of Subprojects and Contribution of Subproject Emission Reduction to Target Emission Reduction

Subproject and Indicator	Expected Emission Reduction	Emission Reduction to Be Achieved by Subproject	Contribution to the Subproject City/County Target (%)
Chengde			
SO_2 emission reduction (ton)	9100	49.25	0.54
NOx emission reduction (ton)	7800	24.63	0.32
Particulate matter emission reduction	7500	16.99	0.23
Pingshan			
SO_2 emission reduction (ton)	5000	0	0
NOx emission reduction (ton)	29700	0	0
Particulate matter emission reduction	2300	0	0
Xingtai			
SO_2 emission reduction (ton)	5000	2.83	0.06
NOx emission reduction (ton)	32500	17.82	0.06
Particulate matter emission reduction	7500	0	0
Zhangjiakou			
SO_2 emission reduction (ton)	1400	26.68	1.91
NOx emission reduction (ton)	8000	1650.15	20.63
Particulate matter emission reduction	600	8.69	1.45

6.1.3 Optimization Measures for Cumulative Impacts of Ambient Air

1) It is required to effectively promote air pollution control action plan and the work processes of all projects as determined by the cities in their air pollution control action plans. For these purposes, they shall make good use of the opportunity of integration in Jing-Jin-Ji Area and gradually transform the coal-dominated energy structure of Hebei Province, increase the proportion of clean energy utilization, adjust the industrial organization of Hebei Province, eliminate the production capacity requiring high energy consumption and high coal consumption, reduce air pollutant emissions, thereby improving the ambient air quality in Jing-Jin-Ji Area.

2) The governments involved shall implement strictly with the air pollutant emission reduction requirements, while guarantee the proper implementation of funding and programs in terms of emission reduction for projects, structures and management, to ensure the achievement of all goals of 2013-2017 action plans, as well as the improvement of regional environmental ambient air quality in Hubei Province.

3) Effective measures shall be taken to ensure the smoothly synchronous implementation of the closure of 204 sets of distributed small coal-fired heating boilers, so as to make contribution to the accomplishment of emission reduction targets, thus improving the regional ambient air quality.

6.2 Analysis of Cumulative Social Impacts

Implementation of this project will improve district heating ability, consequently, some distributed small heating boiler rooms in Chengde, Xingtai and Zhangjiakou subprojects will be shut down, and small boilers will be dismantled and eliminated. As a result, boiler workers in these places will be unemployed and be confronted with the problem of re-employment. This issue does not apply to the Pingshan subproject as no small boiler rooms have to be shut down. The main content of this analysis of cumulative social impacts identified in this project will be the issue of re-employment of the boiler workers affected by the boilers closure, which will start emerging successively during the project construction period (2015 – 2017).

6.2.1 Dismantlement Plan for Other Local Small Boilers

Four subproject cities/counties are now implementing crucial air pollution prevention and control action plans, of which Chengde and Zhangjiakou has established dismantlement and elimination plans for small boilers that not listed in this project. For instance: Chengde has already carried into practice closure and elimination projects for 222 sets of distributed heating boilers and tea bath furnaces in Chengde Limin Almond Processing Co., Ltd. and other companies; and Zhangjiakou is implementing closure and elimination projects for 37 distributed heating boilers and tea bath furnaces in Hebei architecture and civil engineering university and other units. Pingshan and Xingtai are also assume the tasks of "elimination of coal firing boiler lower than 35 tons steam before 2017", which means that each subproject city will face the same problem of re-employment of laid-off firemen. The time these problems appear will be the effective date of the plan, namely 2013 - 2017.

6.2.2 Social Impact Analysis of the Project

Implantation of this project would bring social impact to some certain degree. The positive impacts include: 1) Improve resident life quality, especially for the heating quality. 2) Reduce heating expenses. 3) Decrease disease incidence. 4) Reduce workload of housework for women and promote women's development. 5) Implementation of district heating will increase local job opportunities. 6) Help facilitate women's participation in public affairs decision-making. 7) Reduce subsidy, which is beneficial to alleviation of fiscal burden on government.

Aside from the problems of social environment, such as dust emission and noise, the problem of re-employment of laid-off boiler workers affected by the closure of small distributed boiler rooms will be another negative impact of society aspect that this project brings on. Of the four subprojects, three subprojects as Chengde, Xingtai and Zhangjiakou except Pingshan have concerned with the dismantlement and elimination of small boilers, among which, Zhangjiakou subproject is the most prominent as to both the number of boiler rooms closed and small boilers dismantled, or the number of laid-off boiler workers. The number of affected boiler rooms and boiler workers are listed in **Table 6-6**.

Table 6-6 Boiler Room and Fireman Being Affected

	Chengde	Pingshan	Xingtai	Zhangjiakou	**Subtotal**
Small boiler rooms closed (set)	4	0	22	99	**125**
Small boilers dismantled and eliminated (set)	6	0	40	158	**204**
Laid-off firemen (person)	19	0	81	259	**359**

6.2.3 Analysis of Cumulative Social Impact

As for subproject cities/counties, the extent of the impact of the re-employment of the laid-off boiler workers the project bring on is not the same, the cumulative effect is also different. Among these, in Xingtai and Zhangjiakou subprojects, the ratio of the number of laid-off boiler worker to that of the whole city is comparatively big. It is evident that the social impact which this project

produces would aggravate the pressure on the re-employment of local laid-off boiler workers and increase the accumulative impact. Therefore, appropriate measures and actions have to be taken in order to resolve the laid-off boiler worker problem this project brings, and make them get re-employed successfully. The local unemployed population which may possible increases will be alleviated, reduced or eliminated after those measures implemented. In this way, negative accumulative impact can be reduced or eliminated, the employment pressure on local government can be reduced as well. Especially for such subproject city as Zhangjiakou, it makes greater positive contribution.

6.2.4 Mitigation Measure of Cumulative Social Impacts

In order to reduce or even eliminate the accumulative society impacts the project brings, each of the heating company has developed reemployment plan and specific implementation measures for the boiler workers. The core content includes: to enable the laid-off boiler workers to take on new positions through vocational training, for making stable re-employment guarantee against new difficulty. The sustenance level of boiler workers will be not lower than that of before the project, so as to reduce the local employment pressure. Moreover, more communication with boiler workers during the process of re-employment is necessary, for making each worker get job suitable for his own characteristics. Specific mitigation measures are as follows:

Chengde subproject: 19 laid-off boiler workers are all retained and arranged for the coal slag removal work.

Xingtai subproject: A total of 60 boiler workers will be needed for mechanical, electrical, instrument maintenance, security and other positions working in heating networks, heating primary stations and heating stations after the completion of the project; about 40 patrols and inspection workers will be needed in heating stations during winter operation. Therefore, 81 laid-off boiler workers in Xingtai will be assigned as follows: 1) 8 workers continue to work in the local property management company; 2) the rest 73 workers will be retained by RISUN An'neng Heating Co., Ltd. and will be assigned with new post of duty.

Zhangjiakou subproject: Among 259 laid-off boiler workers in Zhangjiakou, 1) 110 boiler workers have already made it clear that they will leave the original posts voluntarily after the 2014 - 2015 heating season and no longer engaged in this work. Among them, 59 persons have already found new job in other construction sites, and 23 non-local boiler workers will leave Zhangjiakou for new jobs in other cities. Another 28 younger boiler workers hope to get some practical technical training, such as cooking, pastry making, car beauty etc., through which they can find a new employment in these industries. The heating company has already arranged related trainings for them. 2) 149 boiler workers hope to get retained or engage in similar work with the original nature of the work, or engage in other work through job transfer. They will be retained in the heating company. 3) Dongyuan Heating Company will be responsible for the technical training of all retained boiler workers for relevant job; Human resources and Social Security Bureau in Qiaodong district will be responsible for technical training of other workers that leaves the Dongyuan Heating Company.

By taking these mitigation measures, all boiler workers of involuntary unemployment will be ensure to get good trainings and new jobs. Their income will be not less than that of before laid-off. These measures have already been included in the environmental management plan of the project and will be effectively implemented so as to reduce and eliminate its adverse effects.

7 Due Diligence

Due diligence has been conducted to heat source enterprises and closure of small boilers in the project cities/counties.

Due diligence of heat source enterprises has been conducted for four subprojects, which include current status of heat source enterprises, process and layout, pollution source and monitoring condition, environmental performance of existing heating facilities, environmental protection measures and the follow-up technical improvement measures for environmental protection etc.

Due diligence of small boilers (boiler rooms) closure/demolition has been conducted for three subproject except Pingshan subproject, which include number/capacity, location, staffing, heating service area and whether asbestos and rock wool heat insulation materials and environmental impact analysis etc. are involved,

7.1 Due Diligence to Heat Source Enterprises

Seven heat source enterprises need due diligence for the four subprojects, and they are State Power Luanhe Power Plant (main heat source) and north-east countryside heat source plant (peak load heat-source) in Chengde, Xibaipo Power Plant in Pingshan, Hebei China Coal RISUN Coking Co., Ltd. (main heat source) and RISUN Anneng Heating Co., Ltd (stand-by heat source) in Xingtai, and Datang Power Plant (main heat source) and Dongyuan Heating Co., Ltd (stand-by heat source) in Zhangjiakou.

7.2.1 Chengde

7.1.1.1 Chengde State Power Luanhe Power Plant (Main heat source)

1. Basic Information

Founded in 1958, State Power Luanhe Power Plant is located approximately 13.5km southwest of Chengde City and belongs to China Guodian Corporation. It has experienced six phases of expansion and upgrading. 1 No. 25MW generator unit and 2 Nos. 50MW units constructed in Phase I and Phase II were officially disused in May 2009; 2 Nos. 100MW units constructed in Phase III and IV (Generator Unit No. 6 and 7) were respectively disused on Nov. 2 and Dec. 2, 2012; 2 Nos. 330MW heating unit (No. 1 and No. 2 unit) constructed in Phase V were respectively put into operation in August and November 2008 and passed the acceptance procedure of the Ministry of Environmental Protection in March 2009; 1 No. 330MW heating unit (No. 3 Unit) constructed in Phase VI accomplished the 168 hour trial operation at the end of October 2012 and passed the environmental protection acceptance in March 2014.

With a staff of 1,150 and total installed capacity of 990MW, State Power Luanhe Power Plant is the thermal power plant with the largest capacity and also the major supplier of electricity and heat source in Chengde area. It has been verified that the Plant complies with the national industrial policy in terms of both equipment and technology.

2. Plant Area Layout

The main production area of State Power Luanhe Power Plant comprising of Unit 1#, Unit 2# and Unit 3# is located in the middle of the Plant while the water treatment plant is located in the northwest part and the coal yard and ash bank located in the southern part as shown in **Figure 7-1**.

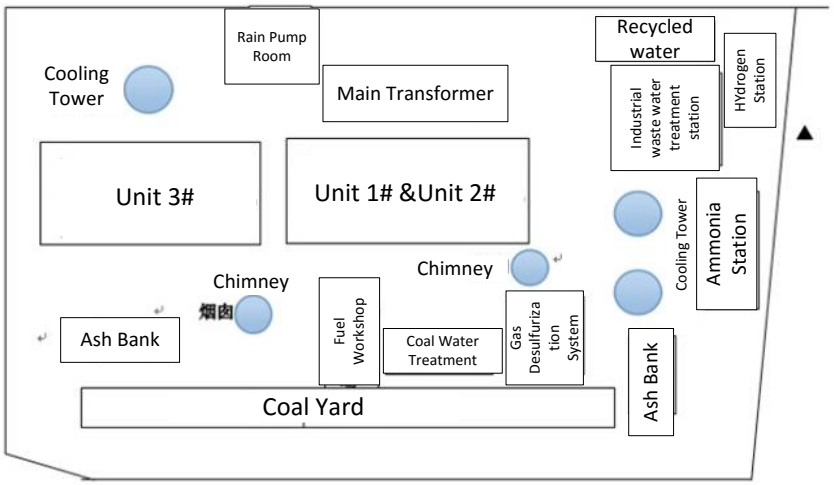


Figure 7-1 General Layout of the Plant Area of State Power Luanhe Power Plant

3. Environmental Protection Institution and Environment Management

State Power Luanhe Power Plant established it environmental protection management system with the General Manager as the primary responsible person of environmental protection activities and the manager-in-charge as the direct responsible person to enable conscientious performance of environmental protection responsibilities.

The Plant also established its accountability and appraisal mechanism for environmental protection activities to embed environmental protection and management in each and every production management process of fuel management, safety management, maintenance management, operation management, defect management and reliability management and develop a portfolio of environmental protection management covering the whole enterprise, the whole staff and the whole process.

Following the requirements of the new national laws and standards of environmental protection and taking account of its own reality, the Plant revised and improved its environmental protection procedures and systems, including the Environmental Protection Management System, the Environmental Protection Supervision and Management Standard, the Detailed Rules for Supervision and Implementation of Environmental Protection Activities, Emergency Response Plan for Unexpected Environmental Incidents, Operation and Management Standard of Environmental Protection Equipment, Detailed Rules for Management of Desulfurization Operation and Maintenance, and established a sound operation mechanism of environmental protection. In addition, a procedure was also developed for reporting to the environmental protection authority after a certain environmental protection facility is decommissioned.

Rules and procedures for operation and maintenance of desulfurization, denitration, dust removal and CEMS system were developed and published on bulletin board. Environmental protection facilities are incorporated into major equipment operation management and appraisal management.

Emergency Response Plan for Unexpected Environmental Incidents was developed to assure that the emergency response action is initiated immediately and implemented in an effective and orderly manner in case of any unexpected environmental incidents so as to minimize environmental hazards and damages caused by such unexpected environmental incidents.

4. Construction and Operation of Environmental Protection Facilities

(A) Desulfurization Facility

The flue gas desulfurization system of Unit No. 1 and No. 2 of State Power Luanhe Power Plant adopts the limestone-gypsum wet-type flue gas desulfurization technology with a designed desulfurization efficiency of greater than 95% and Beijing Guodian Longyuan Environmental Engineering Co., Ltd. as the general contractor. The desulfurization system adopts a configuration of one-furnace plus one-tower unit system. The desulfurization system of both generator units were respectively put into service simultaneously with the respective units in August and November 2008 and passed the acceptance of MOEP in March 2009. In October 2012 and October 2013, the bypass flue pipes of the desulfurization system of Generator Unit No. 1 and No. 2 were removed upon generator unit maintenance, together with which a technical renovation was carried out to combine the induced draft fan and the booster fan. In 2014, in order to further reduce SO_2 emission, the Company carried out another renovation involving a total investment of CNY 63,000,000 to increase the efficiency of the desulfurization system of Generator Unit No. 1 and 2. As a part of this renovation, the absorption tower was heightened, two circulating slurry pumps, two spray layers and collecting bowls and one oxidation fan were added, and the capacity of the absorbent preparation, gypsum dewatering and process water systems was increased. Generator Unit No. 1 installation was finished in November 2014, with its 168-hour trial operation ended on Dec. 24 the same year; Generator Unit No. 2 installation was finished in early December 2014, with its 168-hour trial operation ended on Dec. 25 the same year. In 2014, Generator Unit No. 1 and No. 2 achieved a 100% desulfurization commissioning rate and an average efficiency of 96.1% and the weighted average sulfur content of loaded coal reached 0.78%.

The flue gas desulfurization system of Generator Unit No. 3 of State Power Luanhe Power Plant adopts the limestone-gypsum wet-type flue gas desulfurization technology with a designed desulfurization efficiency of greater than 95%. The desulfurization system has no bypass and Beijing Guodian Longyuan Environmental Engineering Co., Ltd. is the general contractor. The desulfurization system was put into trial production simultaneously with Generator Unit No. 3 November 2012. In 2014, Generator Unit No. 3 achieved a 100% desulfurization commissioning rate and an average efficiency of 97.3% and the weighted average sulfur content of loaded coal reached 0.92%.

(B) Denitration Facilities

In October 2012, as a part of Level A maintenance of Generator Unit No. 1, State Power Luanhe Power Plant carried out a renovation to its boiler low-nitrogen burner. In November the same year, the denitration technology renovation project as well as the CEMS system construction and interconnection activity were implemented. As its 168-hour trial operation as a part of the flue gas denitration technology renovation ended on Oct. 29, 2013, Generator Unit No. 2 was put into normal operation. Generator Unit No. 1 and No. 2 adopt the low-nitrogen burner + selective catalytic reduction (SCR) technology for flue gas denitration, with liquid ammonia as the reducer and the catalyzer adopting the two-active and one-backup configuration, involving a total investment of CNY 142,320,000. The denitration system of Generator Unit No. 1 and 2 is running normally. In 2014, both units achieved a comprehensive denitration efficiency of 78.6% and an outlet NOx concentration of less than 100mg/Nm^3.

The SCR denitration system for Generator Unit No. 3 of State Power Luanhe Power Plant was constructed simultaneously to achieve all flue gas denitration with liquid ammonia as the reducer and the catalyzer adopting the two-active and one-backup configuration. The system is currently running normally. In 2014, the unit achieved a comprehensive denitration efficiency of 81.9% and an outlet NOx concentration of less than 100mg/Nm^3.

(C) Dust Collection Facilities

Precipitator of Generator Unit No. 1 and 2 of State Power Luanhe Power Plant is quadruple-field electrostatic precipitator with stable operating parameters of all electric fields and excellent operating condition and the dust collection efficiency can satisfy the design value. In order to enforce the requirements of the Implementation Plan of Air Pollution Prevention and Control Action Plan of Hebei Province and the smoke dust emission limit required in GB13223-2011 and further reduce smoke and dust emission, Luanhe Power Plant invested CNY 48,000,000 in total and carried out the efficiency improvement renovation works of Generator Unit 1 and 2 respectively in October and November 2014 by installing wet-type electric precipitator at the entrance to the chimney. Installation of the wet-type electric precipitator of Generator Unit No. 1 was completed on Oct. 21, 2014 and the 168-hour trial operation ended on November 9 the same year; Installation of the wet-type electric precipitator of Generator Unit No. 2 was completed on Nov. 16, 2014 and the 168-hour trial operation ended on November 28 the same year. The equipment is running normally and the outlet smoke concentration is controlled less than 20mg/Nm^3.

Generator Unit No. 3 of State Power Luanhe Power Plant uses bag-type precipitator, which is in good operation condition. In April 2014, the bags were fully replaced and the dust collection efficiency was further promoted, with the outlet smoke concentration controlled less than 20mg/Nm^3.

(D) Automatic Control Facility (CEMS System)

The CEMS system of State Power Luanhe Power Plant is a product of Beijing SDL Automatic Control System Corporation. In December 2008, the system was interconnected with Chengde Municipal Environment Information Center, via which information is sent up to the Information Center of the Provincial Environmental Protection Department.

Effectiveness review of the pollution source automatic monitoring data is carried out following the requirements of MOEP and Provincial DEP. Every quarter, Hebei Province Environment Monitoring Center carries out comparative monitoring on site. Operation rules and regulations regarding the CEMS system are developed. Special personnel are designated to be responsible for opration and maintenance of CEMS system following the requirements of the technical standard and operation specification to assure the transmission rate and data accuracy. Over the past years, the CEMS System of State Power Luanhe Power Plant has been running normally, achieving a normal data transmission rate of more than 96%.

5. Air Pollutant Emission Monitoring

State Power Luanhe Power Plant is one of the key enterprises for air pollutant monitoring in Hebei Province and the monitoring body is Hebei Province Environment Monitoring Center. Routine monitoring is conducted on a quarterly basis. Summary of routine monitoring results over the years of 2012 to 2014 is shown in **Table 7-1**.

Table7-1 Summary of Key Air Pollutant Monitoring Results of State Power Luanhe Power Plant

Monitoring Date	Test Item	Unit	Result 1	Result 2	Result 3	Emission standard	Compliance Status
Q1 2012	Smoke	mg/m^3	31	34	37	50	Compliant
	SO2	mg/m^3	72	69	80	400	Compliant
	NOx	mg/m^3	436	418	446	450	Compliant
Q2 2012	Smoke	mg/m^3	35	27	32	50	Compliant
	SO2	mg/m^3	230	226	224	400	Compliant
	NOx	mg/m^3	339	330	315	450	Compliant
Q3 2012	Smoke	mg/m3	32	25	30	50	Compliant
	SO2	mg/m3	252	246	243	400	Compliant
	NOx	mg/m3	364	377	359	450	Compliant

Monitoring Date	Test Item	Unit	Result 1	Result 2	Result 3	Emission standard	Compliance Status
Q4 2012	Smoke	mg/m^3	22	26	23	50	Compliant
	SO2	mg/m^3	54	63	60	400	Compliant
	NOx	mg/m^3	381	382	384	450	Compliant
Q1 2013	Smoke	mg/m^3	36	34	38	50	Compliant
	SO2	mg/m^3	161	165	166	400	Compliant
	NOx	mg/m^3	46	48	42	450	Compliant
Q2 2013	Smoke	mg/m^3	28	23	24	50	Compliant
	SO2	mg/m^3	51	46	43	400	Compliant
	NOx	mg/m^3	74	72	68	450	Compliant
Q3 2013	Smoke	mg/m^3	39	42	40	50	Compliant
	SO2	mg/m^3	58	58	56	400	Compliant
	NOx	mg/m^3	67	68	68	450	Compliant
Q4 2013	Smoke	mg/m^3	27	28	28	50	Compliant
	SO2	mg/m^3	65	65	68	400	Compliant
	NOx	mg/m^3	55	53	55	450	Compliant
Q1 2014	Smoke	mg/m^3	37	24	26	50	Compliant
	SO2	mg/m^3	109	106	104	400	Compliant
	NOx	mg/m^3	75	72	77	450	Compliant
Q2 2014	Smoke	mg/m^3	18	22	17	50	Compliant
	SO2	mg/m^3	82	91	83	400	Compliant
	NOx	mg/m^3	53	54	54	450	Compliant
Q3 2014	Smoke	mg/m^3	14	20	24	50	Compliant
	SO2	mg/m^3	54	51	54	400	Compliant
	NOx	mg/m^3	35	33	31	450	Compliant
Q4 2014	Smoke	mg/m^3	14	12	10	50	Compliant
	SO2	mg/m^3	40	38	43	400	Compliant
	NOx	mg/m^3	56	45	39	450	Compliant

According to the above table, the monitoring results of all air pollutants over the past three years in State Power Luanhe Power Plant comply with the standard emission requirements.

6. Conclusions of Environmental Protection Acceptance of the Technological Renovation Project of State Power Luanhe Power Plant

Phase VI Expansion Project of State Power Luanhe Power Plant (i.e. the last technological renovation project) involves 1 No. 330MW generator unit (i.e. Generator Unit No. 3) in 2010. The expansion project was approved by Ministry of Environmental Protection in September 2010 in its approval document numbered Environment Review Doc. No. [2010]287.The expansion project passed the acceptance by the Ministry of Environmental Protection in March 2014 and the acceptance document is numbered Environment Acceptance Doc. No. [2014]42.Here described as follows are the monitoring results of project acceptance:

1) Smoke, SO2, NOx concentration and flue gas blackness comply with the requirements of Period 3 standard in Air Pollutant Emission Standard for Thermal Power Plant (GB13223-2003). The unorganized maximum emission concentration of particular matters at plant boundary complies with the standard limit for unorganized emission specified in Air Pollutant Comprehensive Discharge Standard (GB16297-1996).

2) Maximum daily average emission concentration of pH value, COD, SS, petroleum at the outlet of industrial wastewater treatment facility, and maximum daily average emission concentration of pH value, COD, SS, petroleum at the outlet of circulating cooling water outlet comply with Class III standard in Wastewater Comprehensive Discharge Standard (GB8979-1996); maximum daily average emission concentration of SS at the outlet of coal-containing wastewater treatment facility and maximum daily average emission

concentration of pH value, SS, fluoride, mercury, arsenic and lead at the outlet of desulfurization wastewater treatment facility comply with Class I standard in Wastewater Comprehensive Discharge Standard (GB8979-1996).

3) pH value, total hardness, concentration of fluoride, lead, arsenic and mercury at the discharge outlet of leachate of existing Fanxiying Lime Yard comply with Class III standard of Surface Water Environment Quality Standard (GB3838-2002); pH value, total hardness, fluoride, Potassium Permanganate, mercury, arsenic and lead concentration downstream of the Lime Yard comply with Class III standard of Ground Water Environment Quality Standard (GB14848-93).

4) Daytime and nighttime noise monitoring values on the west, south, east boundary of the Plant comply with Class II standard of Environmental Noise Emission Standard at the Boundary of Industrial Enterprise (GB12348-2008) while daytime and nighttime noise monitoring values on the north boundary of the Plant comply with Class IV standard of Environmental Noise Emission Standard at the Boundary of Industrial Enterprise (GB12348-2008).

It is known from the acceptance and monitoring results that the various pollution sources of this heat source comply with the requirements of compliant emission after the technological renovation.

7.1.1.2 Northeastern Suburb Peak Regulation Heat Source Plant (Peak Regulation Heat Source)

1. Basic Information of Peak Regulation Heating Project

In October 2003, CNNC Fourth Research Institute, delegated by Chengde Heating Group Co., Ltd., undertook the environment impact assessment of Northeast Suburb Peak Load Heat Source Plant Peak Regulation Heating Project. The "Environmental Impact Assessment Report for Chengde Northeast Suburb Peak Load Heating Project" was finalized in January 2004 and reviewed and approved by Chengde Municipal Environmental Protection Bureau in April 2004 via the approval document numbered "Chengde EP Doc. No. [2004] 78". The Project passed the environmental protection acceptance in January 2013.

Under the Peak Regulation Heating Project of Northeast Suburb Peak Regulation Heat Source Plant, 2 Nos. 64MW hot water boilers are constructed and boiler houses, blowers, coal loading system, debris removal system, control room and pump stations among other auxiliary process facilities are provided. DN600 heating pipelines with a total length of 3.0km are installed with a total heating capacity of 128MW. The Project involves a total land area of 18000m^2 and a fixed staff number of 54 persons. The key production equipment of the Project is shown in **Table 7-2**.

Table 7-2: List of Production Equipment of Northeast Suburb Peak Regulation Heat Source Plant

SN	Description	Quantity	Model
1	64MW hot water boiler	2	DZL3-64-1.6/150/90
2	Hot water circulation pump	3	300S-90A
3	Blower fan	2	G4-73-11NO.16D
4	Draft fan	2	Y4-73-11 NO.18D
5	Triple-field electrostatic precipitator	2	XHY-KD60
6	Wet-type desulfurization device	2	Multi-step absorption desulfurization tower

It has been verified that the equipment and process of the heat source plant comply with the national industrial policies.

2. Environmental protection facilities of the peak load heating project

In terms of flue gas treatment, 2 Nos. triple-field electrostatic precipitators are selected with a dust collection efficiency of no less than 99%. The wet-type desulfurization process and limestone-gypsum method are adopted to remove hot SO from the flue gas, achieving a desulfurization efficiency of more than 60%.

Boiler slag generated in the operation stage is sold to Chengde Xinsha Construction Material Co., Ltd., thus involving no discharge to environment.

3. Plant area layout of the peak load heating project

Layout plan of the peak load heating project plant area is shown in **Figure 7-2**. Following the order of technical processes from west to east are respectively the raw coal workshop, the boiler unit, the dust collection and desulfurization system and the water treatment system. The office building is located to the east of the production area.

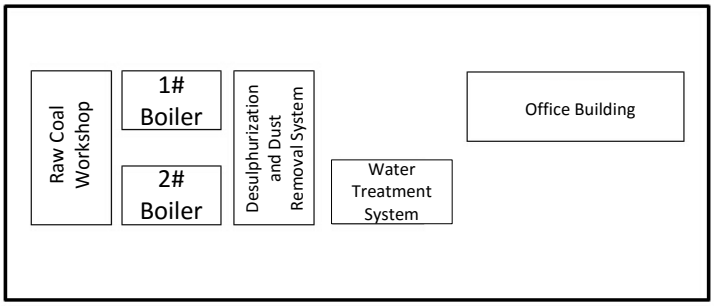


Figure 7-2 Layout plan of the peak load heating project plant area

4. Air pollutant emission of the peak load heating project

Northeast Suburb Peak Load Heat Source Plant is a key enterprise of air pollution source monitoring in Hebei Province. Constructed for peak load and heating, this Plant, according to the investigation, has been running for no more than 10 days per year over the past three years. Due to the very short yearly operation time, the environmental protection authority has not implemented routine monitoring of its operation process over the recent years.

In 2013, during the environmental protection acceptance inspection of the Plant, air pollutant emission during operation was monitored. Results of the acceptance monitoring are shown in **Table 7-3**.

Table 7-3 Acceptance monitoring results of Northeast Suburb Peak Regulation Het Source Plant Heating Project

Monitoring results dated January 20, 2013								
SN	Test item	Unit	First monitoring		Second monitoring		Third monitoring	
			Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
1	Measured smoke concentration	mg/Nm^3	2762	52.7	2725	51.5	2768	53.4
2	Emitted smoke	kg/h	375.6	7.2	373.3	7.1	378.8	7.4
3	Measured concentration of SO_2	mg/Nm^3	2435	246	2347	223	2299	236
4	Emission concentration of SO_2	kg/h	331.2	33.7	321.5	30.8	312.7	32.6
Monitoring results dated January 21, 2013								

SN	Test item	Unit	First monitoring		Second monitoring		Third monitoring	
			Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
1	Measured smoke concentration	mg/Nm^3	2724	49.2	2717	48.6	2735	50.5
2	Emitted smoke	kg/h	362.2	6.6	369.5	6.6	366.49	6.8
3	Measured concentration of SO_2	mg/Nm^3	2442	224	2376	237	2384	229
4	Emission concentration of SO_2	kg/h	324.8	30.2	320.8	32.2	319.5	30.9

As shown in the table above, the air pollutant monitoring results of Northeast Suburb Peak Load Heat Source Plant during operation comply with the emission standard.

5. Conclusions of Environmental Protection Acceptance of Peak Load Heating Project

According to the Environmental Protection Acceptance and Monitoring Report of this project (JiChengHuanCe Doc. No. YS13-007), upon completion of the peak load heating project, the conclusions of pollution emission and monitoring are: (1) the maximum measured values of the emission concentrations of smoke, SO2 and flue gas blackness in the emitted smoke comply with the standard limits for Zone II and Period II in the Boiler Air Pollutant Emission Standard (GB13271-2001). (2) The monitoring results of plant boundary noise are lower than the Class II standard limits specified in the Environment Noise Emission Standard at the Boundary of Industrial Enterprises (GB12348-1990). (3) Water spraying devices are provided in coal yards and ash banks. The concentration of exhaust gas emitted in an unorganized way complies with the standard limit specified in the Comprehensive Emission Standard for Air Pollutants (GB16297-1996). In such a context, the various pollution sources comply with the requirements of compliant emission.

7.1.2 Pingshan

Due Diligence of Xibaipo Power Plant

1. Basic Information

Xibaipo Power Plant is located in the territory of Pingshan County, Shijiazhuang, Hebei Province. The plant is 37km away from the urban area of Shijiazhuang City to the east and 1km from the urban area of Pingshan County to the west, with Huangbizhuang Reservoir, Shi-Qing Highway and Shuo-Huang Railway as its neighbors.

Xibaipo Power Plant has four 300MW coal-fired power generator units and two 600MW coal-fired power generator units that were respectively put into operation in December 1993, November 1994, October 1998, June 1999 and Year 2006. Xibaipo Power Plant is one of the largest power plants in the Southern Power Grid of Hebei Province. See **Table 7-4** for further details.

Table 7-4 Basic Information of Xibaipo Power Plant

Generator unit		4×300MW coal-fired generator unit (No. 1#, 2#, 3# and 4#)	2×600MW coal-fired generator unit (No.5# and 6#)
Time of construction commencement		Unit No. 1# and 2# commenced construction in December 1991; Unit No. 3# and 4# commenced construction in September 1996	Construction commenced in March 2004
EIA approval	**Time**	April 1, 1986	Dec. 3, 2004

	Approved capacity (Generator unit capacity)	1,200,000 kWh	2×600MW
Implemented capacity		4×300MW	2×600MW
Time of trial operation		Generator Unit No. 1# and 2# were put into trial operation respectively in December 1993 and November 1994; Generator Unit No. 3# and No. 4# were put into trial operation respectively in April 1999 and December 1999.	Both generator units were put into trial operation respectively in August 2006 and November 2006.
Time of final acceptance of environmental protection		Generator Unit No. 1# and 2# were accepted in June 2000; Generator Unit No. 3# and 4# were accepted in June 2002	October 2007
Status of operation		Normal operation	Normal operation

2. Layout Plan of the Plant Area

The six generator units of Xibaipo Power Plant are located in the middle of the plant area and arranged from northeast to southwest, with the coal yard located on the northwest side of the plant area and the water treatment system on the southeast. See **Figure 7-3** for details.

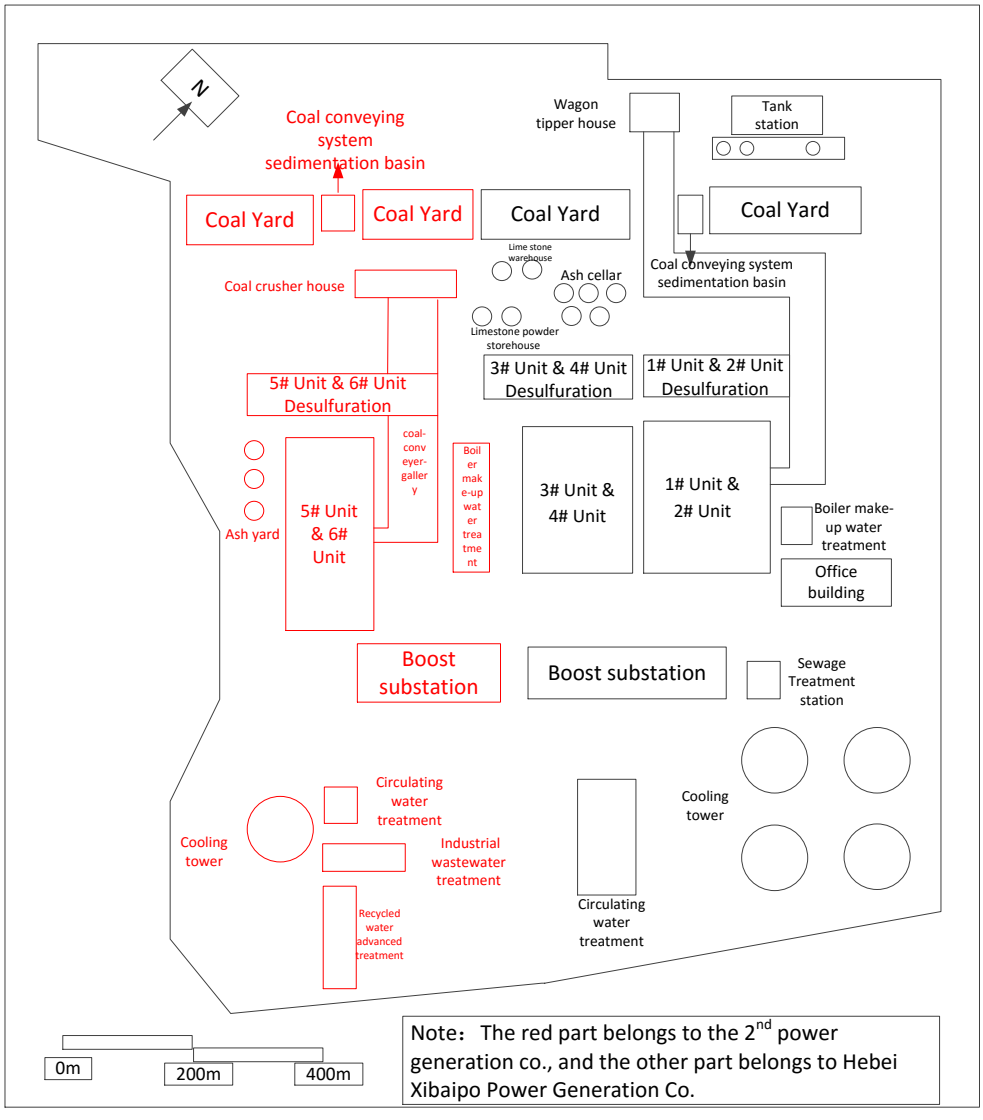


Figure 7-3: Layout Plan of the Plant Area of Xibaipo Power Plant

3. Key Production Facilities

See **Table 7-5** and **Table 7-6** for key production facilities of Xibaipo Power Plant.

Table 7-5 Principal Components and Auxiliary Facilities of Generator Unit No. 1 to 4 of Xibaipo Power Plant

Type	Name	Contents of construction	Status of operation
Principal components	Boiler	4 Nos. B&WB-1025/18.3-M sub-critical intermediate reheating fly ash furnace	Normal operation
	Turbine machine	4 Nos. 300MW sub-critical primary intermediate reheating, single axis, dual cylinder and dual steam discharge, opposite, condensing steam turbine, model:N300/16.7/537(538)/537(538)	
	Generator	4 Nos. 300MWwater-hydrogen hydrogen-cooling turbine generator unit, total installed capacity: 1200MW, Model: QFSN-300-2.	
	Cooling water system	Inverted flow natural ventilation cooling tower with a circulating water utilization rate of 98.79%.	
	Softened water system	Effluent of the circulating water system of Generator Unit No. 3# and 4# is treated through the process of mechanical mixing and clarification→filtering (gravity, mechanical, activated carbon, security filtering)→reverse osmosis treatment and then used as boiler replenishing water in a capacity of approximately 180m^3/h.	
	Power grid supply	8 circuit of 220kV outgoing feeder of the power plant; 2 circuit of the outgoing feeder of 500kV transformer station	
	Ash yard	Fly ash and gypsum currently generated are utilized for comprehensive purposes. Slag from Generator Unit No. 1# is discharged to Shuili Ash Yard, which is located Gaojiayao of Luquan City approximately 15km from the plant area. The Ash Yard is surrounded by mountains on the east, west and south sides and a dam constructed on the north side, belonging to a valley ash yard. The primary dam has a crest elevation of 228m while the final dam will have a designed elevation of 255m.	The existing Shuili Ash Yard is going to be disused gradually.
	Debris removal system	The boiler slag removal device for Generator Unit No. 1# is a wet-type water-sealed periodical slag removal device and the slag discharged on a periodical basis is crushed by a slag crusher and then enters the slag slurry pond to be discharged by the slag slurry pump into the Shuili Ash Yard; Generator Unit No. 2#, 3# and 4# uses dry-type slag removal equipment that uses the Stage 1 and Stage 2 steel conveyors to convey the bottom slag into the slag tank before transported out of site for comprehensive utilization.	Normal operation
	Ash removal system	Fly ash collected by the electric precipitator is collected by means of Positive pressure dense phase pneumatic conveying. Each precipitator has a transmitter underneath, inside which the fly ash is fluidized and floated in the air current by the compressed air and then carried by the air current into the ash tank. The dense phase air current separates dust from air in the tank, with the ash settled in the tank and air filtered by the dust collection cloth-bags before emission.	
Public	Power supply	The 4 Nos. 300MW generator units use the generator-transformer set unit to connect the 200kv system. 200kV power distribution devices are provided in the plant area by using 3/2 wiring.	Normal operation
	Heating	Offices are heated by using air conditioning system while the workshops are heated via turbine extraction.	
	Water supply	1. Boiler replenishing water: Water overflow and drained from water towers, deep well water and water from Huangbizhuang Reservoir are used. Water overflow and drained from water tower is subject to OR treatment before replenished to the water treatment system. Water treated through coagulation, sedimentation, filtering and desalting meets the requirements of boiler replenishing water. 2. Domestic water: Ground water is used for domestic purposes.	
	Drainage	1. Plant area drainage uses the storm and sewage separate drainage system, with storm water drained into plant storm water pipeline and then out of the plant	

Type	Name	Contents of construction	Status of operation
		area; 2. Treatment of desulfurized wastewater: Wastewater discharged from the flue gas wet-type desulfurization process is neutralized, sedimented and coagulated before reused in the desulfurization system; 3. Acid and alkaline wastewater from the treatment process of boiler replenishing water is treated in the neutralization tank and then reused; 4. Domestic sewage is treated in the internal domestic sewage treatment station and then reused in the circulating water system.	
Auxiliary	Laboratory	The laboratory has a building area of 2618m^2 and its main function is acceptance test of materials and quality test of products.	Normal operation
	Equipment repair	The equipment repair workshop has a building area of 9943m^2 and a repair staff of 344 persons. The main function of the workshop is inspection and repair of all the equipment of the Plant and the main equipment include plate shearing machine, polishing machine, grinding machine, electric welding machine, fork lift, etc.	
	Cafeteria	In the Plant, there is one cafeteria with a floor area of approximately 3107m^2 and serving breakfast, lunch and supper for the staff. The cafeteria can accommodate 700 to 900 persons per meal.	
	Office building	The Company has two comprehensive office buildings, one being 5 floors and the other 7 floors, with a total building area of approximately 13795m^2.	

Table 7-6 Principal Components and Auxiliary Facilities of Generator Unit No. 5-6 of Xibaipo Power Plant

Type	Name	Contents of construction	Status of operation
Storage and transportation	Storage of primary and auxiliary materials	1. Coal yard: Outsourced bunker coal is unloaded and temporarily stored in the coal yard upon delivery. The coal yard is 280m long, 50m wide and 14m high, with an effective capacity of approximately 220,000 tons. The coal transportation system is divided, with the coal yard as the boundary, into coal unloading part and coal loading part. The stocking and reclaiming equipment takes coal from the coal yard and deliver the coal, based on coal type, into the respective silo. Coal is supplied by proportion through the vibration feeder on the silo bottom. The mixed coal is delivered to the screening and crushing chamber where the coal is crushed into a certain gradient and then delivered into the raw coal silo. 2. Limestone: The Plant as a whole has 2 limestone sub-silos, 2 limestone powder tank with a diameter of 12m and a height of 18m, with bag-type duct collector installed on the top of the bank; 3. Fly ash: Fly ash is stored in storage tanks. There are 5 round-shaped tanks with a diameter of 12m and a height of 18m, with bag-type precipitator installed on the top. 4. NaOH: cylinder storage; 5. Fuel oil: The oil storage has an area of 3839m^3 and comprises of two 1000m^3 oil tanks; 6. Hydrochloric acid: cylinder storage.	Normal operation
	In-plant transportation	1. The fuel coal is delivered to the plant by railway and trucks. 2. The Plant's internal private railway is connected with the private railway of Xingtai Coal Mine via Shi-Tai South Railway. Goods are loaded at the freight station and loading station at Shouyang Railway Station and Baiyangshu Railway Station and transported along Shi-Tai Railway for 88km to Nanxincheng Railway Station on the national railway and then enter the local railway and are delivered to the Power Plant for handover. The internal private railway is 1200m long and equipped with 2 heavy train lines, 2 unloaded train lines and 1 locomotive travelling line. 3. The truck coal unloading ditch is 60m long and has totally 17 dump truck	

Type	Name	Contents of construction	Status of operation
		bays.	
Environmental protection	Treatment of exhaust gas, industrial dust and wastewater	1. Dust suppression wall is erected around the coal yard and water spray pipes are provided. Pulverized coal is transported via enclosed belt corridor. 2. Power plant dust collection: No. 3# and No. 4# precipitators are dual-chamber triple-field electrostatic precipitators; No. 1# precipitator is an electrostatic—fabric integrated precipitator and No. 2# precipitator used to be a dual-chamber triple-field electrostatic precipitator and was replaced by a bag-type precipitator in December 2010. 3. Desulfurization is achieved using the flue gas limestone-gypsum wet-type desulfurization process, which mainly comprises of absorbent preparation system, SO_2 absorption system, flue gas system, gypsum treatment system and wastewater treatment system. 4. Chemical water treatment consists of boiler replenishing water treatment, condensation water fine treatment, circulating cooling water treatment and hydrogen preparation and thermal network replenishing water treatment. The treatment process adopted is the microfilter→RO→chemical treatment process.	Normal operation

4. Production technology and pollutant discharge status

Conventional thermal power generation is the main business of Xibaipo Power Plant. The technical process is introduced briefly as follows: raw coal from the coal yard is conveyed via the trestle to the plant area and further through the coal crusher into the coal silo as boiler fuel; steam generated by the boilers drives the turbine generator to generate electricity, which is connected to the internal distribution device and then delivered via the power transmission lines to the users. Heating is achieved through generator unit steam extraction. Steam-water heat exchange primary station is provided in the plant area and heat is supplied to the external users via the circulating water pump of the heating network. Boiler flue gas enters the tail chimney and flows through the fuel economizer, air preheater and electrostatic precipitator and then the limestone-gypsum wet-type desulfurization process (external wet-type desulfurization) before discharged via the chimney. See **Figure 7-4** for the production process and pollutant discharge.

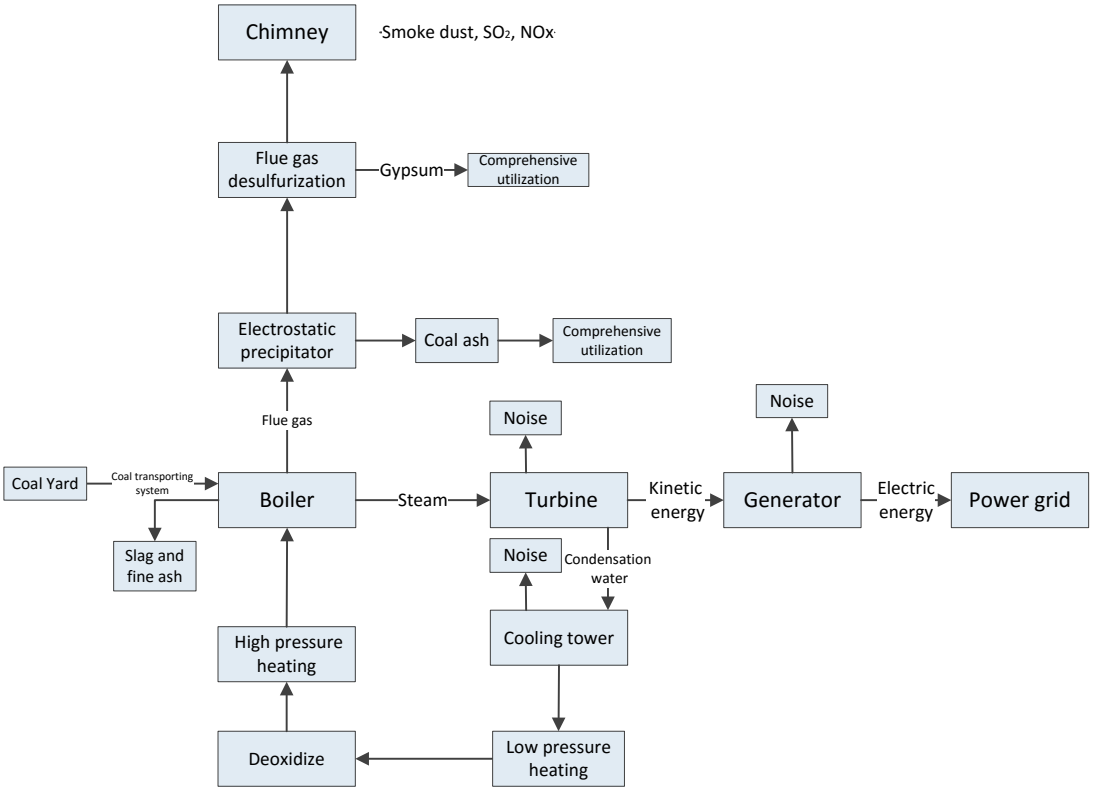


Figure 7-4 Diagram of Production Technology and Process and Pollutant Emission of Xibaipo Power Plant

(A) Air pollutant emission

The air pollutants emitted by Generator Unit No. 1-4 of Xibaipo Power Plant achieves an emission concentration of 5.5mg/m3 for smoke dust, 79.5mg/m3 for SO2 and 70.1mg/m3 for NOx, while Generator Unit No. 5-6 achieves a pollutant emission concentration of 7.3mg/m3 for smoke dust, 46.7mg/m3 for SO2 and 49.51mg/m3 for NOx. Smoke dust and NOx satisfy the emission limits required in Thermal Power Plant Air Pollutant Emission Standard (GB13223-2011); SO2 emission concentration of Generator Unit No. 1-4 still does not meet the limit value requirements while that for Generator Unit No. 5-6 does. See **Table 7-7** for total air pollutant emission over the past three years.

Table 7-7 List of Air Pollutant Emission of Xibaipo Power Plant

	Pollutant	Total emission for Year 2012 (ton)	Total emission for Year 2013 (ton)	Total emission for Year 2014 (ton)
Generator Unit No. 1-4	S02	9710.07	6055.6	5165
	NOX	33554	20215	11803
Generator Unit No. 5-6	S02	5569.48	2786.2	2288
	NOX	17900.6	16709	7047

(B) Wastewater Discharge

Xibaipo Power Plant uses the storm water-sewage separate drainage system for plant area drainage. The storm water is drained into plant storm water pipeline and then out of the plant area into the municipal pipelines. Wastewater discharged from the flue gas wet-type desulfurization process is neutralized, sedimented and coagulated before reused in the

desulfurization system; acid and alkaline wastewater from the treatment process of boiler replenishing water is treated in the neutralization tank and then reused; Domestic sewage is treated in the internal domestic sewage treatment station and then reused in the circulating water system. Therefore, wastewater from Xibaipo Power Plant is substantially not discharged into the environment, with storm water as an exception.

(3) Noise

Results of monitoring in the operation stage show that boundary noise of Xibaipo Power Plant can meet Class II standard included in Environment Noise Emission Standard at the Boundary of Industrial Enterprises (GB12348-2008).

(4) Solid wastes

General industrial solid wastes generated in the production processes of Xibaipo Power Plant include fly ash, furnace slag and desulfurized gypsum. Waste engine oil is the main hazardous industrial waste generated during equipment maintenance. Fly ash and desulfurized gypsum are fully used in a beneficial way, achieving a beneficial use rate of 100%. The beneficial use rate of furnace slag can reach 75%. Waste engine oil is handed over the qualified agency for safe disposal according to the requirements of the environmental protection department. Waste handover manifests are prepared upon handover. All such wastes are properly handled. In general, the enterprise's solid wastes are effectively treated and handled. See **Table 7-8** and **Table 7-9** for detail (where the data of Year 2008 to 2011 is given, but statistical data thereafter is no available).

Table 7-8 Disposal of General Solid Wastes in Xibaipo Power Plant

	Period of examination	Name of solid waste	Generation capacity (t/a)	Capacity of beneficial use (t/a)	Rate of beneficial use (%)	Approach of beneficial use or destination of discharge
Generator Unit No. 1-4	Year 2008	Fly ash	758578	758578	100	Fly ash is sold to Hebei Jineng Environmental Protection and New Material Co., Ltd., and Luquan Jinyu Dingxin Cement Co., Ltd.; desulfurized gypsum is sold to Shijiazhuang Huawei Environmental Protection Material Co., Ltd.; furnace slag is sold and used in road construction and building backfill. The slag removal system of Generator Unit No. 1 has not been renovated and the slag is still discharged to Shuili Ash Yard by means of hydraulic slag removal. The Company as a whole has achieved a slag beneficial use and safe disposal rate of 100%.
		Desulfurized gypsum	84583	84583	100	
		Furnace slag	54126	40594.5	75	
	Year 2009	Fly ash	715816	715816	100	
		Desulfurized gypsum	79815	79815	100	
		Furnace slag	69758	52318.5	75	
	Year 2010	Fly ash	1033505	1033505	100	
		Desulfurized gypsum	126962	126962	100	
		Furnace slag	158340	118755	75	
	January to June 2011	Fly ash	525594	525594	100	
		Desulfurized gypsum	133624	133624	100	
		Furnace slag	42616	31962	75	
Generator Unit No. 5-6	Year 2008	Fly ash	357701	357701	100	Fly ash is sold to Hebei Jineng Environmental Protection and New Material Co., Ltd., Luquan Jinyu Dingxin Cement Co., Ltd. and Baicheng Hua'ao Construction Material Co., Ltd.; desulfurized gypsum is sold to Shijiazhuang Huawei
		Furnace slag	39885	39885	100	
		Desulfurized gypsum	62460	62460	100	
	Year 2009	Fly ash	267416	267416	100	
		Furnace slag	29817	29817	100	
		Desulfurized gypsum	58101	58101	100	

	Period of examination	Name of solid waste	Generation capacity (t/a)	Capacity of beneficial use (t/a)	Rate of beneficial use (%)	Approach of beneficial use or destination of discharge
	Year 2010	Fly ash	486425	486425	100	Environmental Protection Material Co., Ltd.; furnace slag is sold and used in road construction and building backfill.
		Furnace slag	44933	44933	100	
		Desulfurized gypsum	92638	92638	100	
	January to June 2011	Fly ash	209333	209333	100	
		Furnace slag	16973	16973	100	
		Desulfurized gypsum	40691	40691	100	

Table 7-9 Disposal of Waste Engine Oil of Xibaipo Power Plant

	Period	Name of waste	Type of waste	Generation capacity (t/a)	Disposal	Overview of disposal unit			
						Certificate No.	Scope of business	Disposal capacity (t/a)	Validity of competence
Generator Unit No. 1-4	Year 2008	Waste engine oil and oily waste	HW08 waste mineral oil	4.3	Temporary stored in plant area and then recovered by engine oil supplier	/	/	/	/
	Year 2009			3.8					
	Year 2010			0.5	Disposal delegated to NCPC Environmental Protection Research Institute	Hebei Hazardous Permit No. 201007	Medical waste, waste medicine and drugs, waste mineral oil, waste emulsifier, etc.	6000	May 2010 – May 2015
	January to June 2011			0	/	/	/	/	/
Generator Unit No. 5-6	Year 2008	Waste engine oil	HW08 waste mineral oil	2.6	Temporary stored in plant area and then recovered by engine oil supplier	/	/	/	/
	Year 2009	Waste engine oil		2.7					
	Year 2010	Waste engine oil		0.5	Disposal delegated to NCPC Environmental Protection Research Institute	Hebei Hazardous Permit No. 201007	Medical waste, waste medicine and drugs, waste mineral oil, waste emulsifier, etc.	6000	May 2010 – May 2015
	January to June 2011	Waste engine oil		0	/	/	/	/	/

5. Pollution Management and Control Measures

(A) Air pollution control measures

Dust suppression wall is erected around the coal yard and water spray pipes are provided. Pulverized coal is transported via enclosed belt corridor. Desulfurization is achieved using the flue gas limestone-gypsum wet-type desulfurization process, which mainly comprises of absorbent preparation system, SO2 absorption system, flue gas system, gypsum treatment system and wastewater treatment system. No. 1# precipitator is an electrostatic—fabric integrated precipitator and No. 2# precipitator is a bag-type precipitator. No. 3# and No. 4# precipitators are dual-chamber triple-field electrostatic precipitators. With the above measures taken, smoke dust and NOx satisfy the emission limit required in Thermal Power Plant Air Pollutant Emission Standard (GB13223-2011).

(B) Noise Pollution Control Measures

After the selection of low-noise equipment and measures of foundation vibration reduction and indoor layout, plant boundary noise satisfies Class II standard specified in Environmental Noise Emission Standard at Boundary of Industrial Enterprises, i.e. ≤60dB(A) in daytime and ≤50dB(A) in nighttime.

(C) Wastewater Pollution Control Measures

Domestic wastewater is treated adopting the sedimentation→aeration→contact oxidation→sterilization treatment process and then reused in the circulating water system; washing water of the coal conveyance system and the sprayed wastewater from coal yard are reused in coal yard spraying after sedimentation, with the coal sludge returned to the coal yard; acid and alkaline wastewater generated from the condensation water treatment system, the boiler replenishing water treatment system and the boiler inorganic acid wash water treatment system are neutralized in the neutralization tank for pH adjustment and then reused for wetting of dry ash; desulfurization wastewater treatment system includes triple tank (neutralization tank, reaction tank and coagulation tank), clarifier, sludge circulating pump, sludge conveyance pump, sludge cake pressure filter and other equipment and the desulfurized wastewater is treated and fully reused. The power plant thus involves no discharge of wastewater.

(D) Solid Waste Pollution Control Measures

General industrial solid wastes generated in the enterprise's production processes include fly ash, furnace slag and desulfurized gypsum while the hazardous waste mainly includes waste engine oil generated during equipment repair. Fly ash of Generator Unit No. 1-4 is sold to Hebei Jineng Environmental Protection and New Material Co., Ltd., and Luquan Jinyu Dingxin Cement Co., Ltd.; desulfurized gypsum is sold to Shijiazhuang Huawei Environmental Protection Material Co., Ltd.; furnace slag is sold and used in road construction and building backfill. The slag removal system of Generator Unit No. 1 has not been renovated and the slag is still discharged to Shuili Ash Yard by means of hydraulic slag removal. Fly ash of Generator Unit No. 5-6 is sold to Hebei Jineng Environmental Protection and New Material Co., Ltd., Luquan Jinyu Dingxin Cement Co., Ltd. and Baicheng Hua'ao Construction Material Co., Ltd.; desulfurized gypsum is sold to Shijiazhuang Huawei Environmental Protection Material Co., Ltd.; furnace slag is sold and used in road construction and building backfill. Waste engine oil is handled in a safe way by the delegated qualified unit.

6. Environment Management and Institution

Environment management of Xibaipo Power Plant is the responsibility of the Vice General Manager in charge, with the Production Technology Department as the environment management institution and the full-time internal environmental protection supervisor responsible for routine environment management activities of the Plant as a whole.

Environment management activities in Xibaipo Power Plant are implemented under the administrative leader responsibility system and the accountability system; the enterprise's Environmental Protection Management Center gives awards and premiums to groups and individuals with outstanding contribution in environmental management; the Emergency Response Command Center follows the respective laws, regulations and management rules of environmental protection to take respective actions against the responsible units and individuals in case of any late reporting, false representation, concealment and under-reporting of important and extra-large unexpected environmental incidents, important information or any other professional misconduct dereliction of duty in emergency response activities.

7. Monitoring Plan and Information Disclosure

Xibaipo Power Plant developed a detailed self-monitoring plan as detailed in **Table 7-10** following the requirements of the "(Trial) Method of Self-monitoring and Information Disclosure by National Key Monitored Enterprises".

Table 7–10 Environment Monitoring Plan of Xibaipo Power Plant

Monitoring item / **Monitoring content**		**Monitoring location**	**Monitoring frequency**	**Emission standard limit values to be followed**	**Monitoring method**	**Analytical instrument**
Monitoring indicator	Flue gas flow rate	Desulfurization inlet	Continuous	—		
	SO2 concentration	Desulfurization inlet	Continuous	—		
	Oxygen	Desulfurization inlet	Continuous	—		
	Temperature	Desulfurization inlet	Continuous	—		
	Smoke dust	Mixed flue pipe	Continuous	200mg/Nm3	Single-side laser reflection method	Shenzhen Rainbow Valley RBV-DUST
	SO2 concentration	Mixed flue pipe	Continuous	800 mg/Nm3	UV fluorescence method	Tianjin Blue SkYFB-1000; USA Thermal Power 43i
	NOx concentration	Mixed flue pipe	Continuous	1100 mg/Nm3	UV fluorescence method	Tianjin Blue Sky FB-1000；USA Thermal Power42i
	Flue gas flow rate	Mixed flue pipe	Continuous	No applicable limit	Pitot tube differential pressure measurement	Qingdao Laoying 3060
	Temperature	Mixed flue pipe	Continuous	No applicable limit	Thermal resistance	Qingdao Laoying 3060
	Oxygen	Mixed flue pipe	Continuous	No applicable limit	Zirconium oxide	
Method and destination of pollutant emission		Emitted through chimney into the atmosphere				
Monitoring quality control		A three-level review system involving internal monitoring technicians, departmental director and enterprise manager has been established internally.				
Deadline of monitoring results disclosure		Requirement: The basic information of the enterprise and the self-monitoring plan should be disclosed by the end of December in each year and updated within 5 days in case of any adjustments and changes; self-monitoring results, manual monitoring data and reasons of non-implementation of self-monitoring should be disclosed the day after each monitoring is finished; automatic monitoring data and results should be disclosed on a real-time basis; the automatic monitoring data for wastewater automatic monitoring equipment is the 2-hour average while that for exhaust gas automatic monitoring equipment is the hourly average; the yearly report of self-monitoring implementation of the previous year should be published at the end of				

	January each year. The aforesaid information should be disclosed on the website of the Municipal Environmental Protection Bureau and the website and front gate electronic display of the enterprise.

In fact, the technical approach of self-monitoring that the enterprises uses is to establish the self-monitoring system. Full process quality control assures the accuracy and reliability of monitoring data. Use of standard monitoring and analysis method, acceptable monitoring instruments and qualified monitoring staff as well as the three level monitoring data review system assure high quality results of self-monitoring.

In addition, Xibaipo Power Plant has stipulated and implemented the following measures (requirements) regarding enterprise self-monitoring: 1) The basic information of the enterprise and the self-monitoring plan should be disclosed by the end of December in each year and updated within 5 days in case of any adjustments and changes; 2) self-monitoring results, manual monitoring data and reasons of non-implementation of self-monitoring should be disclosed the day after finishing each monitoring; 3) automatic monitoring data and results should be disclosed on a real-time basis; the automatic monitoring data for wastewater automatic monitoring equipment is the 2-hour average while that for exhaust gas automatic monitoring equipment is the hourly average; 4) the yearly report of self-monitoring implementation of the previous year should be published at the end of January each year; 5) the aforesaid information should be disclosed on the website of the Municipal Environmental Protection Bureau and the Plant, and the front gate electronic display of the enterprise.

8 Renovation Plan of the Near Future

The renovation plan of the near future of Xibaipo Power Plant includes the three aspects as follows:

(1) In order to enable SO2 emission concentration to be less than or equal to 35mg/m3 as specified for gas-fired turbine in the emission standard, it is scheduled to renovate the desulfurization system of Generator Unit No. 1-4. According to the renovation program, one absorption tower will be added on the basis of the existing desulfurization system to achieve the dual-tower serial operation. The renovation is in progress and will be completed by the end of October 2015.

(2) In order to enable smoke emission concentration to be less than or equal to 5mg/m3 as specified for gas-fired turbine in the emission standard, it is scheduled to preserve space of wet-type electric precipitator during renovation to the desulfurization system of Generator Unit No. 1-4. In the future, wet-type electric precipitator will be added based on the circumstances. In addition, active efforts will be made soon to identify and implement a proven and reliable precipitator renovation solution which is suitable to the boilers coal quality of Generator Unit No. 5 and 6, and will be finished by the end of 2015.

(3) In order to enable NOx emission concentration to be less than or equal to 50mg/m3 as specified for gas-fired turbine in the emission standard, it is scheduled to summarize the operating condition of the denitration system of the existing generator units. When the required conditions are ready, backup catalyzer layer will be added and the treatment capacity of the denitration system will be increased to assure compliant emission concentration.

7.1.3 Xingtai

7.1.3.1 Hebei China Coal RISUN Coking Co., Ltd. (Main heat source)

1. Basic Information

China Coal RISUN was founded in 2003 and is located in RISUN Economic Development Zone west of Shixiang Village, Yanjiatun Town in the northeastern part of Xingtai County. Involving a land

occupation of approximately 84.1 ha., RISUN has 5 Nos. 60-holetamping coke ovens (Coke Oven No. 1, No. 2 and No. 3 were constructed in Phase I and Coke Oven No. 4 and No. 5 in Phase II), 2 Nos. 48-hole JNDK55-05F tamping coke ovens (respectively numbered No. 6 and No. 7 belonging to Phase III) as well as the supporting coal preparation system, coal gas purification system and other public and auxiliary facilities.

2. Plant Area Layout

See **Figure 7-5** for the layout of the plant area of China Coal RISUN.

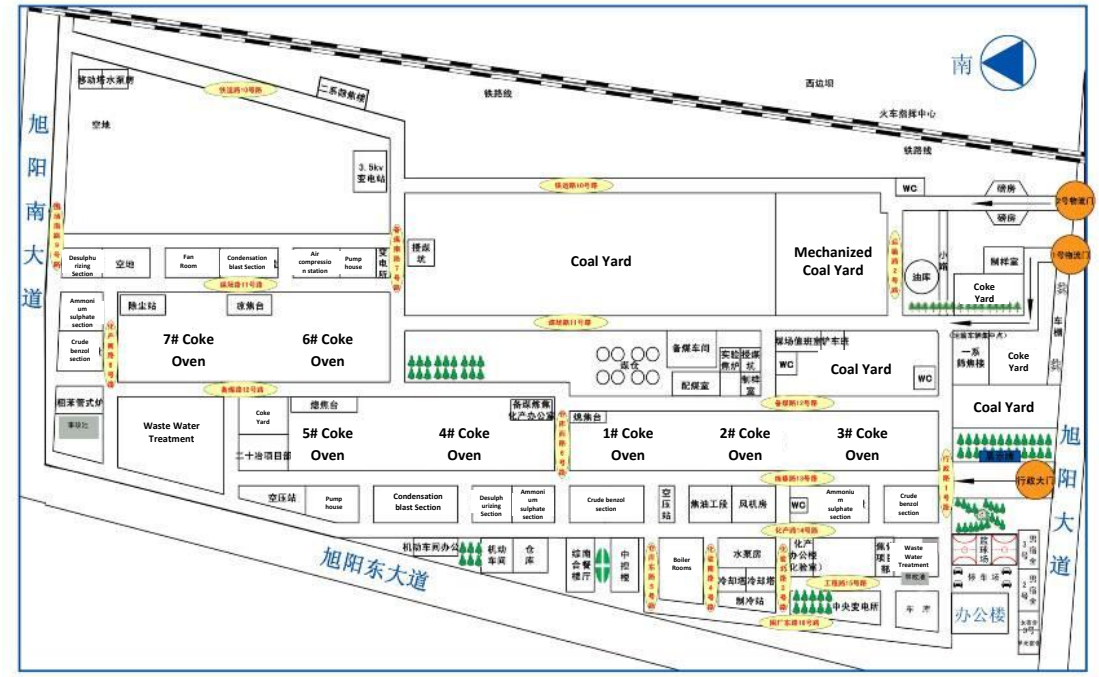


Figure 7-5 Layout plan of the plant area of China Coal RISUN

4. Production Facilities

See **Table 7-11** to **7-14** for the production facilities in Phase I, II and III and the under constructed projects in the plant area of China Coal RISUN.

Table 7–11: List of Key Production Equipment of Phase I Project

SN	Production system	Key equipment			
		Description	Model	Number (set)	
1	Coal preparation system	Stacking and reclaiming machine	DQL800/1200-30	2	Used in Phase I Project only
2		Bridge-type spiral unloading machine	250t/h	4	
3		Reversible hammer crusher	PFCK1818	2	
4	Coking system	60-hole coking oven	JNDK43-99D	3	
5		Tamping coal loader	--	3	
6		Coke pusher	--	3	
7		Coke guide	--	3	
8		Quenching car	--	2	
9		Haulage motor	--	2	
10		Tamper	6-hammer	6	
11		Coke pushing and dust collection system	--	2	
12		Quenching tower	--	2	
13		Smoke prevention and dust control vehicle	--	3	
14		Coke oven chimney	80m	3	

15	Coal gas purification system	Mechanized ammonia clarifying tank	VN300m3	3
16		Primary cooler	FN=4637 ㎡	3
17		Electric separator	DN5200 H14544	2
18		Coal gas blower fan	--	2
19		Desulfurization tower	DN5500, H30000	2
20		Regeneration tower	--	2
21		Ammonia still	DN1400 H13300	2
22		Ammonium sulfate saturator	DN4200/3000,H10160	2
23		Final cooler	DN4000, H36290	1
24		Benzol washer	DN3800, H43551	1
25		Benzol scrubber	DN2000, H40850	1
26		Tube furnace	4.652MW-2.45MPa-Φ140/Φ114	1
27	Auxiliary system	No. 1 phenol cyanide wastewater treatment station (used together with Phase II)	A2/O biochemical method, 4800m3/d	1
28		Refrigerating machine	SXZ4-407	3
29		Air compressor station	Air compressor	5

Table 7–12 List of Key Production Equipment of Phase II Project

SN	Production system	Key equipment			
		Description	Description	Description	
1	Coal preparation system	Stacking and reclaiming machine	DQL800/1200-30	1	1 No. to be used together with Phase III
2		Bridge-type spiral unloading machine	250t/h	2	
3		Reversible hammer crusher	DFCK1825	2	1 No. to be used together with Phase III
4	Coking system	60-hole coking oven	JNDK43-02D	2	
5		Tamping coal loader	--	2	
6		Coke pusher	--	2	
7		Coke guide	--	2	
8		Quenching car	--	1	
9		Haulage motor	--	1	
10		Tamper	6 hammer	4	
11		Coke pushing and dust collection system	--	1	
12		Quenching tower	--	1	
13		Coke oven chimney	110m	2	
14	Coal gas purification system	Primary cooler	FN=4637 ㎡	3	
15		Electric separator	DN5200 H=14544	2	
16		Coal gas blower	--	2	
17		Ammonia still	DN1400, H13300	2	
18		Ammonium sulfate saturator	4200/3000-10160	2	
19		Final cooler	DN4000, H36290	1	
20		Benzol washer	DN3800, H43551	1	
21		Benzol scrubber	DN1800, H25500	1	
22		Crystallizer tank	DN=2400 H=3335 VN=23m3	2	
23		Tube furnace	--	1	
24	Auxiliary system	Phenol cyanide wastewater treatment station (used together with Phase I)	A2/O biochemical method, 4800m3/d	1	
25		Refrigerating machine	S×24-407	3	
26		Air compressor station	BLT300W-34.5/8	5	

Table 7–13 List of Key Production Equipment of Phase III Project

Production system	SN	Name	Model	Qty	Production system	SN	Name	Model	Qty
Coal preparation	1	Utilizing existing facilities of Phase II				1	Tube furnace	--	1
Coking	1	48-hole coke oven	JNDK55-05F	2		2	HPF desulfurization tower	5800×31700	2
	2	Tamping coal loader	-	2		3	Regeneration tower	4400×44550	2
	3	Coke pusher	With oven door opening/closing device	2		3	Coal gas blower fan	--	2
	4	Haulage motor	--	1	Coal gas purification	4	Pre-cooling tower	DN5500×30000	1
	5	Dust collecting and coke guide machine	--	2		5	Ammonium still	Steam stripping	1
	6	Smoke guide machine	Double sucker	2		6	Ammonium sulfate saturator	DN5000/3800H	2
	7	Quenching car	Fixed and inclined base	1		7	Vibrated fluidized bed drier	--	1
	8	Tamper	6 hammer	6		8	Ammonium sulfur centrifuge	--	1
	9	Hydraulic switch	PC controlled	2		9	Final cooler	DN4000×36290	1
	10	Vibrating screen	--	4	Auxiliary	10	Benzol washer	DN3800×43551	1
	11	Coke oven chimney	120m	2		11	Benzol scrubber	DN1800×25500	1
	12	Ground dust collection station	Pulsed bag-type precipitator	1		12	A2/OPhenol cyanide wastewater treatment station	3600m3/d	1
Coal gas purification	1	Coal gas primary cooler	FN=4726m2	4		13	Air compression station	--	5
	2	Electric separator	DN4600	2		14	Lithium bromide refrigeration station	SCZ4-407	5

Table 7–1 List of Key Production Equipment of Project under Construction

Production system	SN	Name	Model	Qty	Production system	SN	Name	Model	Qty
Coal preparation	1	Deferrizer	--	2	Coal gas purification	5	HPF desulfurization tower	DN5500×30000	2
	2	Feeder	--	2		6	Regeneration tower	DN3800×43550	1
	3	Coal storage and distribution tank	Φ8.0m	8		7	Ammonium still	Steam stripping	1
	4	Reversible hammer crusher	DFCK1616	4		8	Ammonium sulfate saturator	DN4200/3000H	2
Coking	1	48-hole coke oven	JNDK55-05F	2		9	Vibrated fluidized bed drier	--	1
	2	Tamping coal loader	-	2		10	Ammonium sulfur centrifuge	--	1
	3	Coke pusher	With oven door opening/closing device	2		11	Final cooler	DN5600×27700	1
	4	Haulage motor	--	1		12	Benzol washer	DN5600×35300	1
	5	Dust collecting and coke guide machine	--	2		13	Benzol scrubber	DN2800×27200	1
	6	Smoke guide machine	Double sucker	2		14	Tube furnace	--	1
	7	Quenching car	Fixed and inclined	1		15	1st section lean oil	--	4

Production system	SN	Name	Model	Qty	Production system	SN	Name	Model	Qty
			base				cooler		
	8	Tamper	6 hammer	4		16	2nd section lean oil cooler	--	3
	9	Vibrating screen	--	4	Auxiliary	17	Gas-fired boiler	20t/h	2
	10	Coke oven chimney	100m	2		1	Air compression station	--	5 Nos.
	11	Ground dust collection station	Pulsed bag-type precipitator	2		2	—	—	—
Coal gas purification	1	Coal gas primary cooler	FN4000m2	3		3	Lithium bromide refrigeration station	SCZ4-407	5
	2	Electric separator	DN4600	2		4	Tar tank	900m3	2
	3	Coal gas blower fan	--	2		5	Tar tank	1500m3	2
	4	Precooling tower	DN5500×30000	1		6	Phenol cyanide wastewater treatment station (used together with Phase III)	3600m3/d	1

4. Technical process, emission point and control measures

The technical processes of Phase I (Coke Oven No. 1, 2 and 3), Phase II (Coke Oven No. 4 and 5) and Phase III (Coke Oven No. 6 and 7) of China Coal RISUN include coal preparation, coking, coal gas purification system. The flowchart and emission points of each of such systems are shown in **Figure 7-6** and **Figure 7-7**. The emission points and their management measures are summarized in **Table 7-15**.

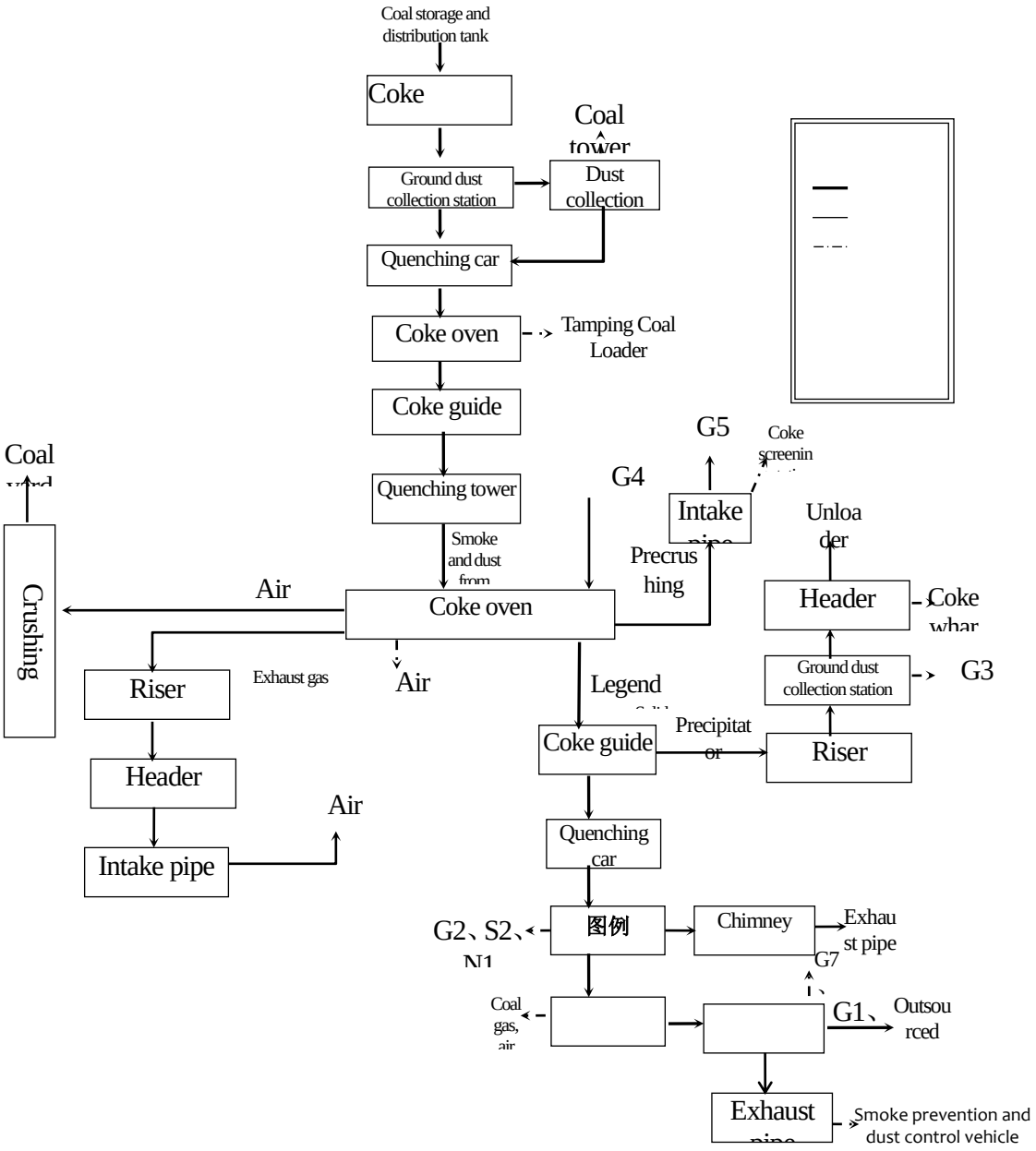


Figure 7-6 Coking Process Flowchart

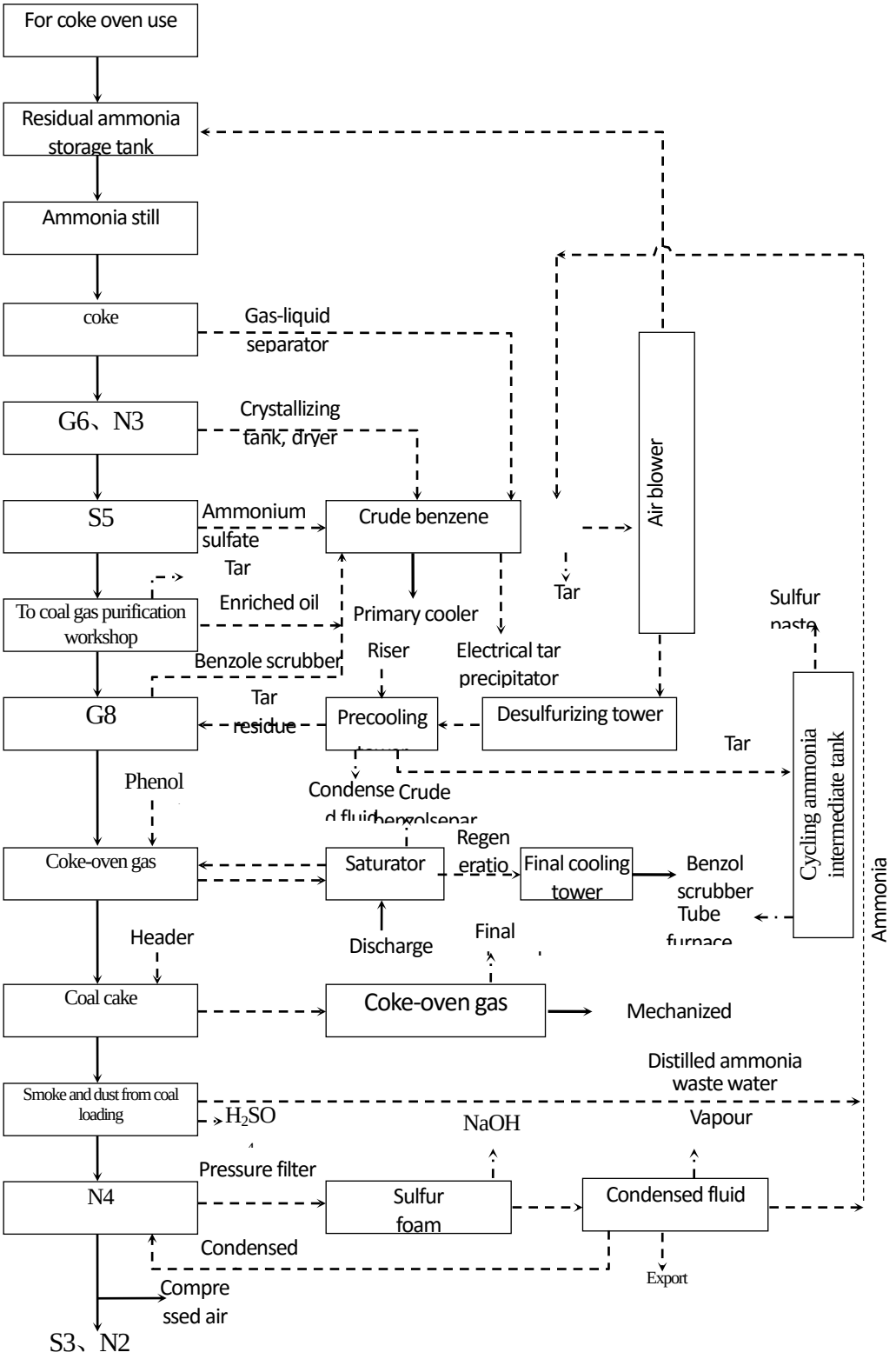


Figure 7-7 Coal Gas Purification Process Flowchart

Table 7-15 Summary of Construction Emission Points

Type	SN	Name of pollution source	Pollutant generation point	Key pollutant	Management measure	Emission characteristics
Exhaust gas	1	Exhaust gas from coal pre-crushing and dust collection	Precrusher	Dust	Bag-type precipitator	Continuous, PS
	2	Exhaust gas from coal crushing	Crusher	dust	Bag-type precipitator	Continuous, PS
	3	Exhaust gas from coal loading (flue gas from furnace end)	Coke oven	Smoke, SO2, BaP	Smokeless coal loading + ground dust collection station	Continuous, PS
	4	Coke oven chimney	Coke oven	Smoke, SO2, NOx	Combustion and utilization of purified coke oven gas	Continuous, PS
	5	Exhaust gas from coke pushing	Coke oven	Dust, SO2	Ground coke pushing station	Continuous, PS
	6	Exhaust gas from coke screening, transportation and dust collection	Quenching tower	Dust	Bag-type precipitator	Continuous, PS
	7	Exhaust gas from ammonium sulfate drying	Ammonium sulfate work section	PM, NH3	Cyclone separator + washing tower	Continuous, PS
	8	Flue gas from tube furnace of benzol washing and scrubbing	Tube furnace	Smoke, SO2, NOx	Combustion and utilization of purified coke oven gas	Continuous, PS
Type	**SN**	**Name of pollution source**	**Point of pollutant generation**	**Pollution factor**	**Treatment measure**	**Treatment effect**
Wastewater	1	Wastewater discharged from water purification system	--	SS、COD	Used for landscaping and road spraying, wetting of dust collection, water washing and spraying tower, replenishing of production system and regulating water of phenol cyanide wastewater treatment station	Fully reused and not discharged to environment
	2	Domestic sewage	--	SS, COD, NH3-N	Septic tank; All sent to phenol cyanide wastewater treatment station and treated with A2/O	Used as replenishing water of coke oven wet quenching system; fully
	3	Production wastewater		SS COD Volatile phenol Cyanide	--	
	4	Wastewater from washing				

		tower and spraying tower		Petroleum NH3-N sulphide		denitrification + decoloring treatment process	reused, zero discharge into environment
	5	Concentrated water from desalinated water preparation system and boilers					

Type	SN	Name of pollution source	Qty	Pollution factor	Management measures	Emission characteristics
Noise	1	Dust collection fan	Several	Lp	Silencer	Continuous
	2	Induced draft fan	Several	Lp	Workshop noise insulation	Continuous
	3	Fan	Several	Lp	Workshop noise insulation	Continuous
	4	Pumps	Several	Lp	Workshop noise insulation	Continuous

Type	SN	Name of pollution source	Pollutant	Type	Destination of emission	Emission characteristics
Solid waste	1	Coal preparation and de-ironing system	Scrap iron	General industrial solid waste	For sale	fully reused
	2	Coal preparation and de-ironing system	Coal dust		Mixed in coking coal for reuse	
	3	Coking and dust collection system	Coke dust		For sale	
	4	Domestic solid waste	--	Domestic solid waste	Delivered to and stored at sites designated by environmental sanitation authority	fully reused
	5	Mechanized ammonium clarifying tank	Tar residue	Industrial hazardous waste	Mixed in coking coal for reuse	
	6	Ammonium sulfate work section	Acid tar		Mixed in coking coal for reuse	
	7	Final cooling and benzol washing section	Residue regenerated from washing oil		Delivered via pipeline to mechanized ammonium clarifying tank	
	8	Phenol cyanide wastewater treatment station	Residual sludge		Mixed in coking coal for reuse	
	9	Desulfurization waste liquid desalting workshop	Waste desulfurization liquid		Mixed in coking coal for reuse	

5. Implemented Environmental standards

(A) Environmental quality standards

1) Ambient air: Class II standards of "Ambient Air Quality Standard" (GB3095-2012) shall be appled; hydrogen cyanide, H2S, benzol, NH3, phenol concentration shall be managed in reference to the maximum allowed concentration of air-borne hazardous substances in residential areas specified in the Design Hygiene Standards for Industrial Enterprises (TJ36-1979); For NMTHC, Class II standard specified in Ambient Air Quality – NMTHC limit value (DB13-1577-2012) shall be applied.

2) Surface water environment: Class V standard specified in Surface Water Quality Environment (GB3838-2002) shall be applied to Baima River (the section from National Highway 107 to Huanshui Village of Renxian County.

3) Ground water: Class III standard specified in Ground Water Quality Standard (GB/T14848-1993) shall be applied.

4) Acoustic environment: Class III standard specified in the Acoustic Environment Quality Standard (GB3096-2008) shall be applied; Class 4a standard shall be applied to the 30m red line boundary on both sides of Xuyang Avenue.

(B) Pollutant emission standards

1) Exhaust gas: Air pollutant concentration limits specified in Table 5 and Table 4 of the Pollutant Emission Standard for Coking and Chemical Industries (GB16171-2012); wet quenched exhaust gas shall be controlled in reference to Class II standards specified in Table 2 in the Air Pollutant Comprehensive Emission Standard (GB16297-1996); odor pollutants shall respect the Class II standard limits for new and reconstruction projects in Table 1 and the pollutant emission limits in Table 2 of the Odor Pollutant Emission Standard (GB14554-93).

2) Wastewater: pH, SS, COD, NH3-N, BOD5 and petroleum in discharged wastewater shall comply with Class 1A standard in Table 1 of the Pollutant Emission Standard of Municipal Wastewater Treatment Plants (GB18918-2002); volatile phenol, sulfide, benzol, cyanide, BaP shall comply with the direct discharge concentration limits in Table 2 of the Pollutant Emission Standard for Coking and Chemical Industries (GB16171-2012); deep treatment purified water shall comply with the water quality requirements for open circulating cooling water system specified in the Water Quality Standard for Industrial Reuse of Municipal Wastewater (GB/T19923-2005).

3) Noise: Plant boundary noise shall follow Class III standards specified in the Environmental Noise Emission Standard at the Boundary of Industrial Enterprises (GB12348-2008)；The north boundary is adjacent to Xuyang Avenue and Class 4 zone standard shall be applied; the corresponding standards specified in the Environmental Noise Emission Standard at the Boundary of Building Construction Sites (GB12523-2011) shall be applied for building construction activities.

4) Solid waste: Standards applied to solid wastes include: (1) Standard for Identification of Hazardous Wastes (GB5085.1～7-2007); (2) Standards for general industrial solid wastes pollution control in storage and treatment site (GB18599-2001)；(3) Standards for pollution control of storage of hazardous wastes (GB18597-2001) and (4) the relevant requirements in the amendment list (MoEP Announcement No. [2013]36).

5) Hygienic protection distance: The Hygienic protection distance for coking industry (GB11661-2012) shall be applied.

For details of the implemented standard values in each of the above standards, please see **Table 7-16** to **Table 7-19**.

Table 7-16 Standard Values in Force --- Environmental Quality Standards

Environmental element	Name of pollutant	Standard value		unit	Source of standards
Ambient air	PM_{10}	24-hour average	150	$\mu g/m^3$	Class II standards in the Ambient Air Quality Standard (GB3095-2012)
		Yearly average	70		
	SO_2	1-hour average	500		
		24-hour average	150		
		Yearly average	60		
	NO_2	1-hour average	200		
		24-hour average	80		

Environmental element	Name of pollutant	Standard value		unit	Source of standards
		Yearly average	40		
	BaP	24-hour average	0.0025		
		Yearly average	0.001		
	NH_3	Once	0.20	mg/m^3	Maximum allowed concentration of air-borne hazardous substances in residential areas specified in the Design Hygiene Standards for Industrial Enterprises (TJ36-1979)
	Hydrogen cyanide	Once	0.30		
	Phenols	Once	0.02		
	H_2S	Once	0.01		
	Benzol	Once	2.4		
		Daily average	0.8		
	NMTHC	1-hour average	2.0	mg/m^3	Class II standard specified in Ambient Air Quality – NMTHC limit value (DB13-1577-2012)
Ground water	pH	6.5～8.5		--	Class III standards in Ground Water Environment Quality Standard (GB/T14848-1993)
	Permanganate index	≤3.0		mg/L	
	Total hardness	≤450			
	Total dissolved solids	≤1000			
	NH3-N	≤0.2			
	Nitrite (N)	≤0.02			
	Nitrate (N)	≤20			
	Sulfate	≤250			
	Volatile phenol	≤0.002			
	Cyanide	≤0.05			
	Fluoride	≤1.0			
	Zn	≤0.05			
	Lead	≤0.05			
	Cr6+,	≤0.05			
	Mercury	≤0.001			
Surface water	pH	6～9		—	Class V standards in Surface Water Environment Quality Standard (GB3838-2002)
	Dissolved oxygen	2		mg/L	
	Permanganate index	15			
	COD	40			
	BOD5	10			
	NH3-N	2.0			
	TP	0.4			
	TN	2.0			
	Cyanide	0.2			
	Volatile phenol	0.1			
	Petroleum	1.0			
	Anionic surface-active agent	0.3			
	Sulfide	1.0			
	Fecal coliform	40000		No./L	
Acoustic environment	L_{eq}	Daytime	65	dB(A)	Class 3 zone in the Acoustic Environment Quality Standard (GB3096-2008)
		Nighttime	55		
		Daytime	70		Class 4a zone in the Acoustic Environment Quality Standard (GB3096-2008)
		Nighttime	55		

Table 7-17 Pollutant Emission Standards --- Standard Values in Force

Type	Pollution source	Name of pollutant	(GB16171-2012) Table 4 – standard values*		(GB16171-2012) Table 5 – standard values*	Unit
Exhaust gas	Clean coal crushing, coke crushing, screening and transportation	PM	50		30	mg/m^3
	Coal loading	PM	100		50	mg/m^3
		SO_2	150		100	
		BaP	0.3		0.3	$\mu g/m^3$
	Coke pushing	PM	100		50	mg/m^3
		SO_2	100		50	
	Coke oven chimney	PM	50		30	mg/m^3
		SO_2	100		50	
		NO_X	800		500	
	Crude benzol tube furnace	PM	50		30	mg/m^3
		SO_2	100		50	
		NO_X	240		200	
	Desulfurization regeneration tower	H_2S	10		3	mg/m^3
		NH_3	60		30	
	Ammonium sulfate crystallization and drying	PM	100		80	mg/m^3
		NH_3	60		30	
		H_2S	11		-	
	Pollution source	Name of pollutant	Standard value		Unit	Source of standard
	Exhaust gas from wet quenching	PM	Emission concentration	120	mg/m^3	Class 2 standards specified in Table 2 in the Air Pollutant Comprehensive Emission Standard (GB16297-1996)
			Emission rate	32.6/109.2		
	Top of coke oven	PM	2.5		mg/m^3	Plant boundary concentration limits in Table 7 of the Pollutant Emission Standard for Coking and Chemical Industries (GB16171-2012)
		BaP	2.5		$\mu g/m^3$	
		H_2S	0.1		mg/m^3	
		NH_3	2.0			
		Benzol	0.6			
	Plant boundary	PM	1.0		mg/m^3	
		SO_2	0.50			
		BaP	0.01		$\mu g/m^3$	
		HCN	0.024		mg/m^3	
		Benzol	0.4			
		Phenols	0.02			
		H_2S	0.01		mg/m^3	
		NH_3	0.2			
		NO_X	0.25			
Wastewater	Deep treatment purification	pH value	6.5～8.5		mg/L	Water quality requirements for open circulating cooling water system specified in the Water Quality Standard for Industrial Reuse of Municipal Wastewater (GB/T19923-2005)
		BOD_5	10			
		COD_{cr}	60			
		Petroleum	1			
		Sulfate	250			
		NH3-N	10			
Noise	Leq	Daytime	65		dB(A)	Class III standards

Type	Pollution source	Name of pollutant	(GB16171-2012) Table 4 – standard values*	(GB16171-2012) Table 5 – standard values*	Unit
		Nighttime	55		specified in the Environmental Noise Emission Standard at the Boundary of Industrial Enterprises (GB12348-2008)
		Daytime	70	dB(A)	Class IV standards specified in the Environmental Noise Emission Standard at the Boundary of Industrial Enterprises (GB12348-2008)
		Nighttime	55		

Note: Standard limits specified in Table 4 of GB16171-2012 applied to existing enterprises before Dec. 31, 2014; Standard limits specified in Table 5 of GB16171-2012 applied to existing enterprises and new enterprises as of January 1, 2015.

Table 7-18 Environmental Noise Emission Limits for Boundary of Building Construction Sites (GB12523-2011) Unit: dB(A)

Daytime	Nighttime
70	55

Table 7-19 List of Hygienic Protection Distances (GB11661-2012)

Description	Local average wind speed for the last five years (m/s)	Distance (m)	Remarks
Coking plant (3 million t/a)	2～4	1000	Min. distance

6. Pollutant Emission and Control

(A) Air pollutants

Key air pollutants generated by the enterprise include dust, smoke, SO2, BaP, NOx, PM and NH3 respectively coming from exhaust gas from coal precrushing and dust collection, coal crushing, coal loading (oven end flue gas), coke oven chimney, coke pushing, coke screening, transportation and dust collection, sulfate ammonium drying and flue gas from tube furnace for benzol washing and scrubbing. The enterprise carries out treatment of the aforesaid air pollutants respectively by means of bag-type precipitator, smokeless coal loading + ground dust collection station, combustion and utilization of purified coke oven coal gas, coke pushing ground station, cyclone separator + washing tower, combustion and utilization of purified coke oven coal gas. See **Table 7-20** for details.

Table 7–20 Summary of Exhaust Gas Emission Points

SN	Name of pollution source	Pollutant generation point	Key pollutant	Management measure	Emission characteristics
1	Exhaust gas from coal pre-crushing and dust collection	Precrusher	Dust	Bag-type precipitator	Continuous, PS
2	Exhaust gas from coal crushing	Crusher	dust	Bag-type precipitator	Continuous, PS
3	Exhaust gas from coal	Coke oven	Smoke, SO2, BaP	Smokeless coal loading +	Continuous, PS

SN	Name of pollution source	Pollutant generation point	Key pollutant	Management measure	Emission characteristics
	loading (flue gas from furnace end)			ground dust collection station	
4	Coke oven chimney	Coke oven	Smoke, SO2, NOx	Combustion and utilization of purified coke oven gas	Continuous, PS
5	Exhaust gas from coke pushing	Coke oven	Dust, SO2	Ground coke pushing station	Continuous, PS
6	Exhaust gas from coke screening, transportation and dust collection	Quenching tower	Dust	Bag-type precipitator	Continuous, PS
7	Exhaust gas from ammonium sulfate drying	Ammonium sulfate work section	PM, NH3	Cyclone separator + washing tower	Continuous, PS
8	Flue gas from tube furnace of benzol washing and scrubbing	Tube furnace	Smoke, SO2, NOx	Combustion and utilization of purified coke oven gas	Continuous, PS

(B) Wastewater

Wastewater discharged from water purification system will be used for landscaping and road spraying, wetting of dust collection, water washing and spraying tower, replenishing of production system and regulating water of phenol cyanide wastewater treatment station to achieve full reuse and zero discharge. Domestic sewage will all be sent to septic tanks or phenol cyanide wastewater treatment station and treated with A2/O denitrification + decoloring treatment process; Production wastewater, wastewater from washing tower and spraying tower and concentrated water from desalinated water preparation system and boilers will be All sent to phenol cyanide wastewater treatment station and treated with A2/O denitrification + decoloring treatment process and used as replenishing water of coke oven wet quenching system aiming at full reuse and zero discharge into environment. See **Table 7-21** for details.

Table 7–21 Summary of Wastewater Emission Points

SN	Name of pollution source	Pollutant generation point	Pollution factor	Treatment measure		Treatment effect
1	Wastewater discharged from water purification system	--	SS, COD	Used for landscaping and road spraying, wetting of dust collection, water washing and spraying tower, replenishing of production system and regulating water of phenol cyanide wastewater treatment station		Fully reused and not discharged to environment
2	Domestic sewage	--	SS, COD, NH3-N	Septic tank	All sent to phenol cyanide wastewater treatment station and treated with A2/O denitrification + decoloring treatment process	Used as replenishing water of coke oven wet quenching system; fully reused, zero discharge into environment
3	Production wastewater		SS COD Volatile phenol Cyanide Petroleum NH3-N sulphide	--		
4	Wastewater from washing tower and spraying tower					
5	Concentrated water from desalinated water preparation system and boilers					

Phenol cyanide wastewater treatment station

The phenol cyanide wastewater treatment station of Hebei China Coal RISUN Coking Co., Ltd. mainly includes three processes, namely pretreatment process, biochemical treatment process, decoloring treatment and post-treatment process. See **Figure 7-8** for the specific technological processes.

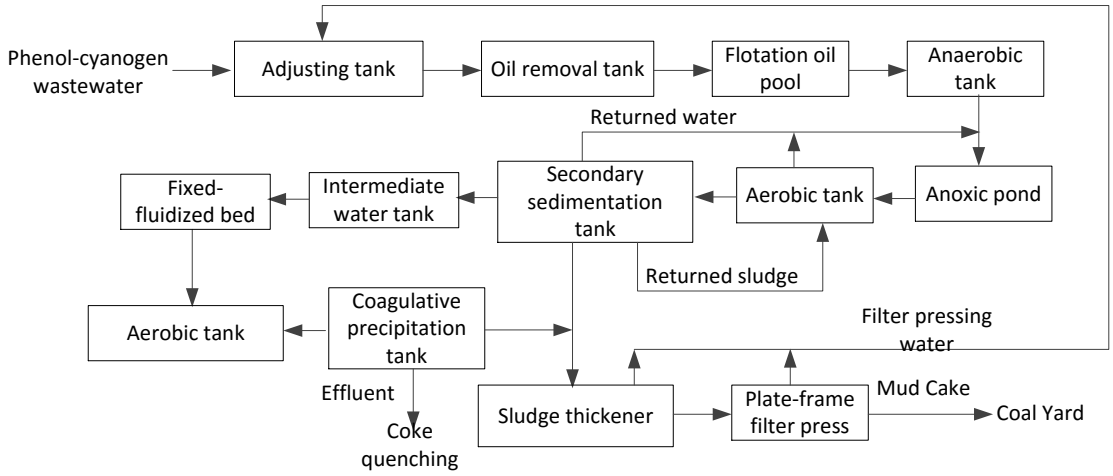


Figure 7-8 Phenol cyanide wastewater treatment flowchart

A2/O biochemical treatment method can effectively remove NH3-N and nitrite in the wastewater and degrade COD therein. In the coking wastewater, biochemically non-degradable organics take a percentage of around 13%-17% of total COD, most of which is PAHs. PAHs is substantially non-degradable in biological treatment in the conventional activated sludge method and that's the reason which COD in treated wastewater remains in the range of 250-400mg/L. However, through anaerobic and aerobic combination, organics in the wastewater with difficulty in biological degradation can be open-chained in the anaerobic tank reducing biologically non-degradable organics to around 8%-10%. In the anaerobic tank, the anaerobic denitrifying bacteria use the organics as the carbon source to have 40% of the COD in the wastewater degraded and the load of the aerobic tank reduced. In such a situation, wastewater entering the aerobic tank can enter the nitrifying stage of oxidation of NH3-N very quickly provided that alkalinity, temperature, pH value and dissolved oxygen are suitable to enable NH3-N to be completely oxidized into nitrite nitrogen and nitrate nitrogen. Wastewater which has been oxidized into nitrite nitrogen and nitrate nitrogen returns to the anoxia tank where the wastewater is deoxidized by the anaerobic denitrifying bacteria into nitrogen and emitted for the purpose of denitrogenation in the anoxia condition.

In this process, pretreatment in the separation tank, the floatation tank and the regulating tank mainly aims to remove heavy oil, light oil and some COD. In the pretreatment stage, 88% of oil and 28% of COD can be removed. The biochemical treatment facilities consisting of the A2/O biochemical tank and the backflow sedimentation tank mainly aim to remove the hazardous substances including COD, NH3-N and sulfide, cyanide and phenol. In the biochemical treatment stage, 95% of NH3-N and 90% of COD can be removed respectively. Subsequent treatment mainly comprises of mud sedimentation tank and sand filter. This section has a COD purification capacity of 50%-80%. **Table 7-22** shows the inlet and outlet water quality of the phenol cyanide wastewater treatment station upon the implementation of the renovation project.

Table 7–2: Influent and Effluent Indicators of Phenol Cyanide Wastewater Treatment Station

(Unit: mg/L)

Treatment stage			Pollutant factor									
			COD	NH3-N	BOD5	SS	Petroleum	Volatile phenol	Cyanide	Sulfide	pH	Chroma
Pretreatment	Separation tank, floatation tank, regulating tank	Influent quality (mg/L)	3500	300	--	300	50	≤700	20	80	7～9	800
		Effluent quality (mg/L)	3000	200	--	≤120	≤5	200～700	3～10	60～100	8～9	800
		Removal rate (%)	Mixed	Mixed	--	60～70%	90%	Mixed	mixed	mixed	--	—
Biochemical treatment	Anaerobic tank, anoxia tank, aerobic tank, secondary sedimentation tank	Influent quality (mg/L)	3000	200	200～300	≤120	≤5	200～700	3～10	≤50	7～9	800
		Effluent quality (mg/L)	100	≤10	20～50	≤120	≤3	≤0.3	≤0.5	≤1	～7	800
		Removal rate (%)	≥96%	≥95%	≥90%	--	40%	≥99%	≥95%	≥95%	--	--
Decoloring treatment	Intermediate tank, fixed fluidized bed, biological fluidized bed	Influent quality (mg/L)	100	≤10	10	≤120	≤3	≤0.3	≤0.2	≤0.2	7～8	800
		Effluent quality (mg/L)	100	≤10	10	≤120	≤3	≤0.3	≤0.2	≤0.2	7～8	20
		Removal rate (%)	—	—	—	—	—	—	—	—	—	≥97%
Post-treatment	Coagulatory sedimentation tank	Influent quality (mg/L)	100	≤10	10	≤120	≤2.5	≤0.3	≤0.2	≤0.2	7～8	20
		Effluent quality (mg/L)	80	10	10	50	2.5	0.3	0.2	0.2	7	20
		Removal rate (%)	20%	--	--	58%	—	--	--	--	--	20
Total removal rate			≥97.7	≥96.7	--	83%	≥95%	≥99.9	≥99.0	≥99.75	--	≥97%

It is thus obvious that, treated with the A2/O biological denitrogenation+decoloring treatment method adopted in the phenol cyanide wastewater treatment station, pH, SS, CODcr, NH3-N, volatile phenol and cyanide and other water quality factors can meet the requirements of indirect discharge standard contained in Table 1 of the Pollutant Emission Standard for Coking and Chemical Industries(GB6171-2012)and the effluent may be used as replenishing water of the wet quenching system and will not be discharged into the environment.

With a designed treatment capacity of 8400m3/d, the plant-area phenol cyanide wastewater treatment station accepts not only wastewater from the plant area of China Coal RISUN, but also production wastewater from the other projects that are either already built or simultaneously constructed in Xingtai Economic Development Zone. The aforesaid projects under construction have passed EIA approval. See **Table 7-23** for volume of water discharged from existing projects into the phenol cyanide wastewater treatment station. See **Table 7-24** for volume of water to be discharged into the phenol cyanide wastewater treatment station from projects under construction upon their implementation.

Table 7–23: Types and Volume of Wastewater Discharged from Existing Projects into the Phenol Cyanide Wastewater Treatment Station (m3/d)

Name of project		Type of wastewater	Discharge Method	Volume
Existing project	Hebei China Coal RISUN Co., Ltd.	Process wastewater	Direct discharge	5324
	Hebei Jinniu RISUN Chemical Industry Co., Ltd.	Process wastewater	Direct discharge	30
	100,000ton/year crude benzene hydrogenation project of Xingtai RISUN	Process wastewater	Direct discharge	50

	Coal Chemical Co., Ltd.			
	Cabbot RISUN Chemical Industry Co., Ltd	Domestic sewage	Direct discharge	10
Total		--	--	5414

Table 7–24 Types and Volume of Wastewater to be Discharged into the Phenol Cyanide Wastewater Treatment Station upon Completion of Projects under Construction (m3/d)

Name of project		Type of wastewater	Discharge Method	Volume
Project under construction	100,000 ton/year cyclohexane project of Xingtai RISUN Coal Chemical Industry Co., Ltd.	Process wastewater, domestic sewage	Direct discharge	60.5
	2x40,000 ton/year Phthalic anhydride Project of Xingtai RISUN Chemical Industry Co., Ltd.	Process wastewater, domestic sewage	Direct discharge	76.4
Project under construction	Coke Oven Gas and Phthalic Anhydride Residual Heat Power Generation Project of Hebei China Coal RISUN Coking Co., Ltd.	Process wastewater	Direct discharge	83
	400,000 ton/year Coal Tar Project of Xingtai RISUN Coal Chemical Co., Ltd.	Process wastewater	Direct discharge after ammonia evaporation in the ammonia evaporation system of China Coal RISUN Coking Co., Ltd.	44.8
		Domestic sewage	Direct discharge	601.5
Total		--	--	866.2

It can be known from analysis of the above table, that upon implementation of the projects under construction, China Coal RISUN Phenol Cyanide Wastewater Treatment Station will achieve a total wastewater treatment volume of 6280.2m^3/d and still have a redundant treatment capacity of 2119.8m3/d, able to meet the need of wastewater treatment of the Project. The wastewater is treated in China Coal RISUN Phenol Cyanide Wastewater Treatment Station and fully used in China Coal RISUN Quenching System.

See **Figure 7-9** for the water balance of the phenol cyanide wastewater treatment station.

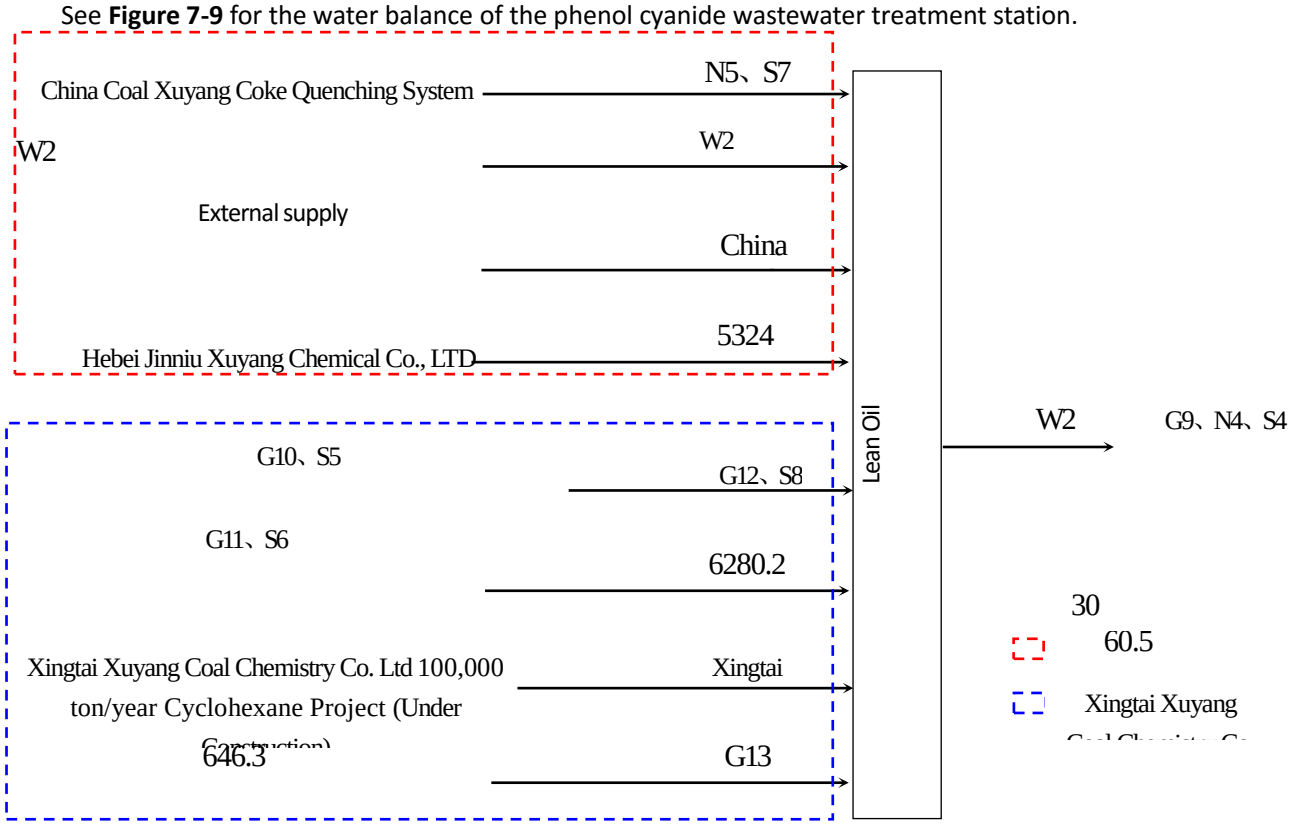


Figure 7-9: Water Balance at Phenol Cyanide Wastewater Treatment Station upon Implementation of the Projects under Construction Unit: m3/d

(C) Solid wastes

General Industrial solid waste discharged from coal preparation and dust collection system and coking and dust collection system will be for sale and mixed in coking coal for reuse. Domestic solid wastes will be delivered to and stored at sites designated by environmental sanitation departments. Tar residue and other hazardous wastes generated from the mechanized ammonium clarifying tank, ammonium sulfate work section, final cooling and benzol washing section, phenol cyanide wastewater treatment station and desulfurization waste liquid desalting workshop will be mixed in the coking coal for being reused or delivered via pipeline to mechanized ammonium clarifying tank aiming as fully reused. See **Table 7-25** for detail.

Table 7–25 Summary of Solid Waste Emission Points

SN	Name of pollution source	Pollutant	Type	Destination of emission	Emission characteristics
1	Coal preparation and de-ironing system	Scrap iron	General industrial solid waste	For sale	Fully reused
2	Coal preparation and de-ironing system	Coal dust		Mixed in coking coal for reuse	
3	Coking and dust collection system	Coke dust		For sale	
4	Domestic solid waste	--	Domestic solid waste	Delivered to and stored at sites designated by environmental sanitation authority	
5	Mechanized ammonium clarifying tank	Tar residue	Industrial hazardous waste	Mixed in coking coal for reuse	
6	Ammonium sulfate work section	Acid tar		Mixed in coking coal for reuse	
7	Final cooling and benzol washing section	Residue regenerated from washing oil		Delivered via pipeline to mechanized ammonium clarifying tank	
8	Phenol cyanide wastewater treatment station	Residual sludge		Mixed in coking coal for reuse	
9	Desulfurization waste liquid desalting workshop	Waste desulfurization liquid		Mixed in coking coal for reuse	

(D) Noise

Under the Project, silencers will be used for treatment of noise from dust collection fans. Noise generated from induced draft fans, blower fans and pumps will be treated by means of workshop sound insulation. See **Table 7-26** for details.

Table 7–3 Summary of Construction Noise Emission Points

SN	Name of pollution source	Qty	Pollution factor	Management measures	Emission characteristics
1	Dust collection fan	Several	Noise	Silencer	Continuous
2	Induced draft fan	Several	Noise	Workshop noise insulation	Continuous
3	Fan	Several	Noise	Workshop noise insulation	Continuous
4	Pumps	Several	Noise	Workshop noise insulation	Continuous

7. Environment management

In order to protect and improve the production, livihood and ecological environment, prevent pollution and other hazards, ensure the sustainable development of the company and the physical health of staff, China Coal RISUN enacted its environmental protection management system according to "The Law of the People's Republic of China on Environmental Protection",

"Regulations of Environmental Protection of Hebei Province" and other relevant laws and regulations and requirements on environmental protection. This system includes China Coal RISUN Work Responsibilities and Duties of Environmental Protection, Operational Management System of Environmental Protection Facilities, Environmental Risk Prevention System, Environmental Inspection Management System, Environmental Monitoring Management System, Pollutant Discharge Declaration Management System, Solid Waste Disposal Management Methods and Environmental Accident Rewards and Punishment Management Regulations (Trial), but does not include Hazardous Chemical Record System, Environment Management Information and File System, Environment Information Disclosure System and Hazardous Chemicals Release and Transfer Report System and other related systems. Although enacted and full and sound in content, the Environment Information Disclosure System and Hazardous Chemicals Release and Transfer Report System have not been effectively implemented and need to be implemented according to the relevant requirements.

A. Basic duties of the environment management body

China Coal RISUN has assigned roles of environmental protection management to its General Manager, Deputy General Manager of Environmental Protection, other Deputy General Managers, Chief Engineer, Chief Accountant, Safety and Environmental Protection Department, Environmental Protection Administrators and workshop managers. Such management posts at different levels are assigned with different roles and responsibilities. Here described as follows are the main responsibilities of different departments:

(1) Environmental protection responsibilities of the General Manager

To formulate, approve and issue and be responsible for realizing the Company's environmental management policies and objectives; to approve and release the Company’s environmental management system; to provide appropriate human, financial, physical and technical resources, to ensure sustainable and effective operation of the environmental management system, and to determine the rights and responsibilities of each functional departments and posts and to enable effective communication within the organization; to organize investigations and analysis of major environmental accidents and take corresponding actions.

(2) Environmental protection responsibilities of the Deputy General Manager of environmental protection

As the responsible person for the environmental protection work of the Company as a whole under the leadership of the General Manager, to be responsible for establishing, implementing and maintaining and ensuring sustainable improvement to the environmental management system; reporting to the General Manager the performance and needs of improvement to the environmental management system; establishing and auditing the environmental protection system; auditing the environmental objectives, indicators and management plan, organizing identification and evaluation of important environmental factors and assuring effective communication and coordination with the environmental protection authority of the upper levels.

(3) Environmental protection responsibilities of the other Deputy General Managers

To assist the Deputy General Manager of Environmental Protection, under the leadership of the General Manager, in implementing the environmental protection work of the concerned subsystems, to be responsible for establishing, implementing and maintaining and ensuring continuous improvement to the internal environmental management systems of the concerned subsystem.

(4) Environmental protection responsibilities of the Chief Engineer

To assist the Deputy General Manager of Environmental Protection, under the leadership of the General Manager, in implementing the environmental protection work of the concerned

subsystems, to be responsible for establishing, implementing and maintaining and ensuring continuous improvement to the internal environmental management systems of the concerned subsystem; to be responsible for technical review of environmental protection technical renovation plans and introduction of new pollution prevention and control technologies;

(5) Environmental protection responsibilities of the Chief Accountant

To assist the Deputy General Manager of Environmental Protection, under the leadership of the General Manager, in implementing the environmental protection work of the concerned subsystems, to be responsible for establishing, implementing and maintaining and ensuring continuous improvement to the internal environmental management systems of the concerned subsystem; to be responsible for appropriation and payment of fund for Environmental protection technical renovations and pollution prevention and control to ensure that the environmental protection projects are effectively implemented;

(6) Environmental protection responsibilities of the Safety and Environment Department

Under the leadership of the Deputy General Manager of Environmental Protection, to be responsible for the environmental protection work of the whole company; responsible for supervising and inspecting and organizing and implementing the routine work of environmental protection, mainly including statistical summary and analysis of the results of tests of coal loading dust collection and wastewater drainage to ensure that wastewater is discharged according to the drainage standards and coal loading and dust collection are carried out in a smokeless way; to strictly implement the basic rules of the Environmental Protection Law and clean production standards issued by the State Environmental Protection Administration; to be responsible for collecting relevant standards and norms for environmental protection to guide the enterprise's production and management activities; to assist the Deputy General Manager of Production in receiving and accompanying inspectors from the superior environmental protection authorities and cooperating with the environment protection work of the superior departments; to be responsible for fulfilling the environmental protection approval procedures for construction projects and handling disputes concerning environmental protection.

(7) Environmental protection responsibilities of the Manager of Safety and Environment Department

Under the leadership of the Deputy General Manager of Production, to be responsible for the environmental protection work of the whole company and the routine environmental protection activities, mainly including statistical summary and analysis of the results of tests of coal loading dust collection and wastewater drainage to ensure that wastewater is discharged according to the drainage standards and coal loading and dust collection are carried out in a smokeless way; to supervise and control the operation status of the environmental protection facilities of the whole company, to cause the Engineering Department to strictly enforce the "three simultaneous" system of construction projects upon construction of environmental protection facilities; to strictly implement the basic rules of the Environmental Protection Law and clean production standards issued by the State Environmental Protection Administration; to assist the Deputy General Manager of Production in receiving and accompanying inspectors from the superior environmental protection authorities and cooperating with the environment protection work of the superior departments; to properly carry out the EIA acceptance work of construction projects; to assist and cooperate with the concerned authorities in handling grievances on issues of environmental protection.

(8) Environmental protection responsibilities of the Environmental Protection Administrator

To earnestly and fully implement the national laws, to perform the duties of an Environmental Protection Administrator according to the principles; to be cooperative and supportive in carrying out the environmental protection work within administration; to report behaviors and activities likely to lead to environmental deterioration, harms to personal health and potential hazards to

the head of department in a timely manner; to prepare and submit to Environmental Protection Bureau monthly, quarterly, annual reports according to the environmental requirements; to carry out daily workshop inspections and coordinate with the concerned workshop to work out a timely solution to any problems and include violations into the scope of assessment and keep records for future reference; to monitor the operation status of environmental protection facilities and implementation of regulations and provide timely guidance to rectify any problems; to guide the work of environmental monitoring and carry out timely inspection of standard implementation; to analyze abnormal data and recommend improvements to enable the data to be usable to guide production; to carry out advertisements and education on environmental protection as well as new employee orientation on environmental protection issues, with records properly maintained; To carry out sampling inspection of pollutant discharge outlets in a timely manner and propose timely improvements to correct any problems identified; to strictly control non-compliant sewage discharge; to be responsible for reviewing sewage fee collection and clean production projects, to organize selection of research theme and provide implementation guidance; to organize the preparation of audit reports; to supervise the treatment of waste residue twice a week and enforce the provisions on such treatment; to properly implement the operation of ISO14001 system certification, monitoring of EIA data and processing of pollutant emission permit; to carry out in a timely manner any tasks assigned by the superior level on a temporary basis.

(9) Environmental protection responsibilities of the other workshop and department directors

To ensure the normal operation of environmental protection facilities and compliance of environmental indicators of the concerned department; to supervise the operation status of environmental protection facilities and implementation of procedures and provide timely guidance for rectification of problems, if any; to assist the Safety and Environment Department in carrying out the environmental monitoring work and conduct timely inspection of the standard enforcement; to analyze abnormal data and propose improvement measures; to give a timely notice to the Safety and Environment Department and any other concerned departments in case of any accident likely to cause environmental impacts and to be responsible for holding accident analysis meetings; to ensure that zero environmental impact accident will occur in the concerned department; to be responsible for managing the environmental protection facilities related to the concerned post; to ensure the compliance of the environmental indicators of the concerned post; to accept periodical training on environmental protection knowledge; to submit timely report of any environmental accidents; to strictly follow the environmental protection policies and all the other policy requirements of the Company.

B. Environment Management System

China Coal RISUN has established the following environmental protection management systems:

1) China Coal RISUN Environmental Protection Management System: China Coal RISUN Environmental Protection Management System is developed based on its reality of production and operation aiming to implement "the Environmental Protection Law of the People's Republic of China " and the keynote of the National Conference of Environmental Protection, to promote the overall level of environmental management in China Coal RISUN and to protect the environment to achieve compliant discharge of pollutants, and to continuously improve environmental performance and achieve sustainable development.

2) China Coal RISUN Dust Precipitator Operation and Management System aims to achieve regulated and institutionalized management of the operation of the existing exhaust gas purification facilities in the plant area.

3) China Coal RISUN Environmental Risk Prevention System: This System is established for the purposes of purifying company environment, assuring staff life quality and physical health, strengthening scientific management of environmental protection and management work, enabling organized and stable discharge of pollutants according to the standards and

satisfying people's environmental requirements and assuring smooth implementation of the various activities concerning the sustainable development of the Company.

4) China Coal RISUN Environmental Inspection System: This System is established for the purposes of quickly promoting China Coal RISUN's level of environment management and enhance company image and mainly covers inspections and assessments of exhaust gas, wastewater and other aspects of plant image and appearance.

5) China Coal RISUN Environment Monitoring Management System: This is a system of periodical monitoring developed for the purposes of assuring normal operation of the environmental protection facilities of China Coal RISUN and periodical monitoring of pollutant discharge compliance status at all pollution sources.

6) China Coal RISUN Duties and Responsibilities of Environmental Protection: This Document is developed in order to identify the duties and responsibilities of managers of all levels and all departments so as to strengthen environmental protection management and assure the environmental protection work is properly carried out.

7) China Coal RISUN Solid Waste Disposal Management Methods: These methods are developed for the purposes of strengthening management and assuring proper disposal of and reducing impacts on plant area and surrounding environment caused by solid wastes generated in the process of production and business operation.

8) Environmental Protection Facility Operation Management System: This System is established based on the Environmental Protection Law of the People's Republic of China, the Environmental Protection Regulations of Hebei Province and other related laws and regulations for the purposes of assuring normal operation of environmental protection facilities, preventing pollution, promoting and improving environmental quality and driving the enterprise towards a reasonable and fast track of development.

9) Environment Management System for Construction Projects: This System is established based on the requirements of the related laws and regulations for the purposes of reducing environmental impacts and strictly implementing the various environmental protection measures during the construction of a project.

10) Coal Yard Spraying System: This System is established for the purposes of protecting the air quality in the surrounding environment, reducing dust and avoids waste of clean coal resources and creates an excellent work environment.

Because of the implementation of a series of strict management systems, the Enterprise has never encountered any environmental and production safety accident ever since it was put into operation.

1. Environmental Quality Condition in the Plant Area

According to the Pollutant Emission Permit (No. PWS-130521–0068) issued by Hebei Provincial Department of Environmental Protection and the results of environmental quality monitoring in the plant area and the surrounding area of Hebei China Coal RISUN Coking Co., Ltd. (monitoring data as included in Attachment C-1 to C-3), the emission concentrations of PM, SO2, NOx measured at each monitoring site in the plant area of China Coal RISUN are in line with GB16171-2012 Table 4 standard limit requirements; in addition, the environmental quality of the sensitive sites around the plant area is in line with relevant quality standards. Daytime and nighttime monitoring results of plant boundary noise are in line with the standard limits of Class II and IV specified in the Environmental Noise Emission Standards at the Boundary of Industrial Enterprises (GB12348 - 2008).

2. Energy-saving and Emission Reduction Upgrading and Renovation

According to the relevant provisions of the Pollutant Discharge Standards for Coking and Chemical Industry (GB16171-2012), the existing enterprises shall enforce the air pollutant emission limits specified in Table 4 from October 1, 2012 to December 31, 2014 and the air pollutant emission limits specified in Table 5 as of January 1, 2015. Therefore, China Coal RISUN needs to enforce the air pollutant emission limit requirements specified in Table 5 in GB16171-2012 as of January 1, 2015.

China Coal RISUN has been implementing a company-wide "Energy-saving and Emission Reduction Upgrading and Renovation Project" since 2012 for the purposes of implementing the national industrial policies including the "Admission Conditions of Coking Industry" (MIIT Industrial Circular No. [2014]14) and meeting the requirement that the existing enterprises shall enforce the air pollutant emission limits specified in Table 5 of the Pollutant Discharge Standards for Coking and Chemical Industry (GB16171-2012) as of January 1, 2015 (See **Table 7-27** for the specific standard values) and also for the purpose of further promoting the enterprise's level of pollution control and clean production, improving energy efficiency and reduce pollutant emission and improve regional ambient air quality. Included in this project are: 1) construction of capture and treatment facilities at exhaust gas and odor pollution sources in the plant area; 2) upgrading of the existing 2 phenol cyanide wastewater treatment stations and construction of deep treatment devices; 3) construction of desulfurization liquid desalting and treatment facilities; 4) relocation and reconstruction of 2 Nos.34-hole JNDK55-05F tamping coke ovens; 5) construction of 1 No. 150t/h, 1 No. 140t/h and 1 No. 170t/h new-method quenching systems and 1 No. 170t/h dry quenching system (with supporting 25MW steam extraction and condensation turbine unit).

The upgrading and renovation project involves a planned investment of CNY 777 million. Upon completion, China Coal RISUN as a whole will have 9 coke ovens (including 5 Nos. 60-hole tamping coke ovens and 4 Nos. 65-hole taming coke ovens) and the supporting coal gas purification facilities and other auxiliary facilities. The products mainly include metallurgical coke and coke oven gas, etc. By that time, the Company as a whole will have a yearly production capacity of 4,520,000 tons of metallurgical coke and 1.99 billion m3 of coke oven gas. On the assumption that the 600,000 ton/year charcoal production capacity of Xingtai RISUN Chemical Industry Co., Ltd. is eliminated and the regional charcoal production capacity will not grow, emission of PM, SO2 and hydrogen sulfide will be reduced respectively by 822.089 t/a, 354.944 t/a and 5.198 t/a and 127,607 t/a standard coal will be saved or recovered. **Table 7-28** shows the energy-saving and emission reduction renovation works already completed by May 2015 while **Table 7-29** shows the outstanding works under the same project.

Table 7-27 New standard values to be enforced as of January 1, 2015

Type	Pollution source	Name of pollutant	(GB16171-2012) Table 4 – standard values*	(GB16171-2012) Table 5 – standard values*	Unit
Exhaust gas	Clean coal crushing, coke crushing, screening and transportation	PM	50	30	mg/m^3
	Coal loading	PM	100	50	mg/m^3
		SO_2	150	100	
		BaP	0.3	0.3	$\mu g/m^3$
	Coke pushing	PM	100	50	mg/m^3
		SO_2	100	50	
	Coke oven chimney	PM	50	30	mg/m^3
		SO_2	100	50	
		NO_X	800	500	
	Crude benzol tube furnace	PM	50	30	mg/m^3
		SO_2	100	50	
		NO_X	240	200	
	Desulfurization regeneration tower	H_2S	10	3	mg/m^3

Type	Pollution source	Name of pollutant	(GB16171-2012) Table 4 – standard values*	(GB16171-2012) Table 5 – standard values*	Unit
		NH_3	60	30	
	Ammonium sulfate crystallization and drying	PM	100	80	mg/m^3
		NH_3	60	30	
		H_2S	11	-	

Note: Standard limits specified in Table 4 of GB16171-2012 applied to existing enterprises before Dec. 31, 2014; Standard limits specified in Table 5 of GB16171-2012 applied to existing enterprises and new enterprises as of January 1, 2015.

Table 7-28 Construction Works Already Completed under the Energy-saving and Emission Reduction Upgrading and Renovation Project

SN	Construction works	Object of renovation		Overview	Construction progress	Time of completion	Investment (CNY10000)	Remarks
1	Construction of capture and treatment facilities at exhaust gas and odor pollution sources in the plant area	1	Coke Oven No. 1#～3#	Renovating the existing 7 foam precipitators of the coke screening and transfer system into 7 bag-type precipitators	Completed	March 2014	330	Satisfying the standard requirements
				Renovating the existing dust collection system of the coal loading , smoke elimination and dust collection vehicle into smokeless coal loading system	Completed	April 2014	1600	
				Delivering the exhaust gas collected from the mechanized ammonium clarifying tank of the coal gas purification section to 1 new water spraying tower for treatment (1x1500m3/h)	Completed	April 2014	770	Active improvement, reduction of pollutant emission
				Delivering the exhaust gas collected from the desulfurization and regeneration tower, the foam tank and the storage tanks of the sulfide ammonium section to 1 new "acid washing tower + water spraying tower" device for treatment	Completed	April 2014	160	
				Delivering the odor gas collected from the biochemical treatment process of No. 1# phenol cyanide wastewater treatment station into 1 No. water spraying tower + low-temperature plasma deodorant device + water spraying tower (1x15000m3/h) for treatment;	Completed	April 2014	500	
		2	Coke Oven No. 4#～5#	Renovating the existing coal loading and dust collection system into smokeless coal loading system;	Completed	June 2014	1600	Satisfying the standard requirements
				Renovating the existing 8 foam precipitators of the coke screening and transfer system into 8 bag-type precipitators	Completed	March 2014	380	
				Delivering the exhaust gas collected from the mechanized ammonium clarifying tank of the coal gas purification section to 1 new water spraying tower for treatment (1x1500m3/h)	Completed	June 2014	770	Active improvement, reduction of pollutant emission
				Delivering the exhaust gas collected from the desulfurization and regeneration tower, the foam tank and the storage tanks of the sulfide ammonium section to 1 new "acid washing tower + water spraying tower" device for treatment	Completed	June 2014	160	
				Construction of 2 x 5.3t/h flue gas residual heat boilers	Completed	April 2014	1400	Saving energy, beneficial use
		3	Coke Oven No. 6#～7#	Renovating the existing coal loading and dust collection system into smokeless coal loading system;	Completed	May 2014	1600	Satisfying the standard requirements
				Renovating the existing 3 foam precipitators of the coke screening and transfer system into bag-type precipitators	Completed	April 2014	140	
		4	Coke Oven No. 6#～7#	Delivering the exhaust gas collected from the mechanized ammonium clarifying tank of the coal gas purification section to 1 new water spraying tower for treatment (1x1500m3/h)	Completed	May 2014	770	Active improvement, reduction of pollutant emission
				Delivering the odor gas collected from the biochemical treatment process of No. 2# phenol cyanide wastewater treatment station into 1 No. water spraying tower +	Completed	March 2014	500	Active improvement, reduction of

SN	Construction works	Object of renovation		Overview	Construction progress	Time of completion	Investment (CNY10000)	Remarks
				low-temperature plasma deodorant device + water spraying tower (1x6000m3/h) for treatment;				pollutant emission
				Delivering the exhaust gas collected from the desulfurization and regeneration tower, the foam tank and the storage tanks of the sulfide ammonium section to 1 new "acid washing tower + water spraying tower" device for treatment	Completed	March 2014	160	
2	construction of desulfurization liquid desalting and treatment facilities;		Coke Oven No. 1#～9#	Construction of 1x100 t/d desulfurization waste liquid desalting facility	Completed	March 2014	2800	Active improvement, reduction of pollutant emission
3	construction of 1x150t/h, 1x140t/h and 1x170t/h new-method quenching systems		Coke Oven No. 1#～7#	Renovating the existing conventional wet quenching system of Coke Oven No. 4# ～ 5# into 140t/h new method quenching system (new low moisture quenching system)	Completed	March 2014	800	Saving energy, beneficial use
				Renovating the existing conventional wet quenching system of Coke Oven No. 6# ～ 7# into 170t/h new method quenching system (new low moisture quenching system)	Completed	April 2014	800	
4	relocation and reconstruction of 2x34-hole JNDK55-05F tamping coke ovens		Coke Oven No. 6#～9#	Relocating 2x25-hole Model 66 compound coke ovens, 1x40-hole JN66-5D and 1x60-hole JNDK43-99D tamping coke ovens from Xingtai RISUN Chemical Industry Co., Ltd. and renovating Coke Oven No. 6# - 9# and constructing 2x34-hole JNDK55-05F tamping coke ovens in China Coal RISUN plant area	Coke Oven No. 6# and 7# completed	December 2012	–	–
					Coke Oven No. 8# and 9# completed	End of 2014		

Table 7-29 Construction Works Remaining Outstanding under the Energy-saving and Emission Reduction Upgrading and Renovation Project

SN	Construction works	Object of renovation		Overview		Construction progress	Time of completion	Investment (CNY10000)	Remarks
1	Construction of capture and treatment facilities at exhaust gas and odor pollution sources in the plant area	1	Coke Oven No. 6#～7#	Construction of 2x6t/h coke oven flue gas residual heat boilers		Under construction	End of 2015	1400	Saving energy, beneficial use
		2	Coke Oven No. 8#～9#	Construction of one enclosed coal shed for storage of raw coal needed for production of the adjusted projects under construction		Under construction	End of 2015	3000	Active improvement, reduction of pollutant emission
				Delivering the exhaust gas collected from the desulfurization and regeneration tower, the foam tank and the storage tanks of the sulfide ammonium section to 1 new "acid washing tower + water spraying tower" device for treatment				160	
				Optimizing and constructing the existing 9 foam precipitators of the coke screening and transfer system into 7 bag-type precipitators				285	Satisfying the standard requirements
2	Construction of 1x150t/h, 1x140t/h and 1x170t/h new-method quenching systems			Coke Oven No. 1#～7#	Renovating the existing conventional wet quenching system of Coke Oven No. 1# ～ 3 into 150t/h new method quenching system (new low moisture quenching system)	Under construction	End of 2015	800	Saving energy, beneficial use
3	construction of 1x170t/h dry quenching system (with supporting 25MW steam extraction and condensation turbine unit)			Coke Oven No. 8#～9#	Construction of 1x170t/h dry quenching device and 1x91t/h residual heat recovery boiler and 1x25MW steam extraction and condensation turbine unit	Under construction	End of 2015	17329.75	Saving energy, beneficial use
4	Upgrading of the existing 2 phenol cyanide wastewater treatment stations and construction of deep treatment devices;			Coke Oven No. 8#～9#	Construction of 1x150m3/h "ultraifiltration+nanofiltration" wastewater deep treatment device	Under construction	End of 2015	7500	Active improvement, reduction of pollutant emission

7.1.3.2 Xingtai RISUN Chemical Industry Co., Ltd. (Standby heat source)

1. Basic information

The backup heat source of Xingtai Subproject is the circulating water of the 2x40,000 ton/year phthalic anhydride project of Xingtai RISUN Chemical Industry Co., Ltd., which is located in RISUN Economic Development Zone west of Shixiang Village of Yanjiatun Town of Xingtai County. The key devices include oxidation reactor, air cooler, switch condenser and rectifying tower. At present, the 2x40,000 ton/year phthalic anhydride production lines are under construction.

2. Layout plan of the Plant area

See **Figure 7-10** for the layout plan of the 2x40,000ton/year phthalic anhydride project of Xingtai RISUN Chemical Industry Co., Ltd.

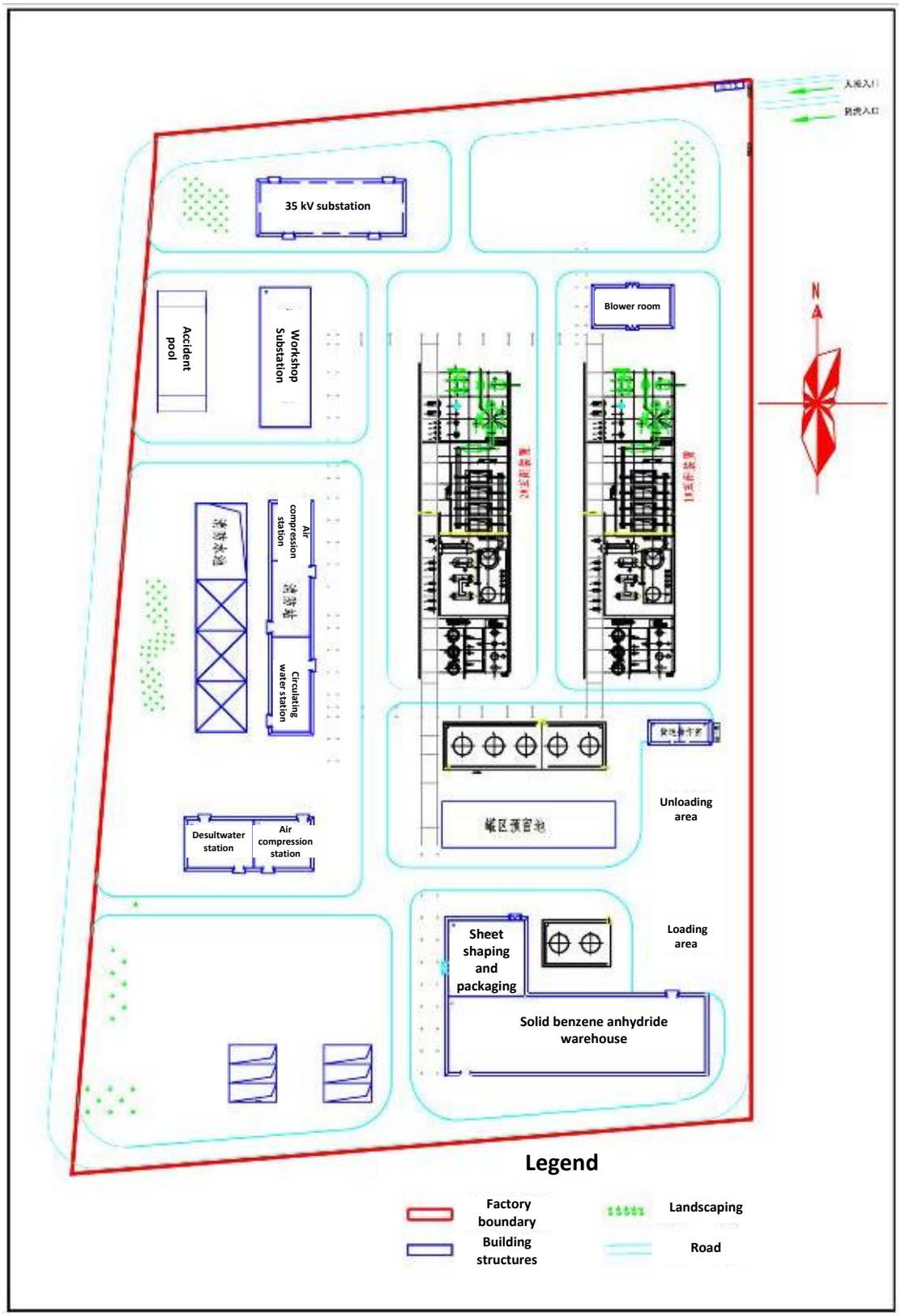


Figure 7-10 Layout Plan of Plant Area

3. Production facilities

See **Table 7-30** for key equipment and **Table 7-31** for key storage and transportation facilities.

Table 7-30: List of key Equipment

Equipment type	SN	Name of equipment	Specification	No./Set	Material
Oxidation reactor	1	Fixed bed reactor	Tube type	2	Carbon steel
	2	Air preheater	Fin tube 2-section	2	Carbon steel
	3	Vaporizer	Nozzle, safety device	2	Carbon steel
	4	Material-air mixer	--	2	Carbon steel
	5	Molten salt cooler	--	2	Carbon steel
	6	Molten salt regulating valve	--	2	Carbon steel
	7	Molten salt tank	Horizontal	1	Carbon steel
	8	Steam superheater	--	2	Carbon steel
	9	Steam manifold	Horizontal	4	Carbon steel
	10	Blower unit	Centrifugal 0.06MpaG	2	Carbon steel
Switch condenser	11	Cold oil cooler	Tube type	2	Carbon steel
	12	Heat conduction oil heater	Tube type	2	Carbon steel
	13	Oil expansion tank	Horizontal 10m3	2	Carbon steel
	14	Accident oil tank	Horizontal 30m3	2	Carbon steel
	15	Air cooler	Fin tube 2-section	2	Carbon steel
	16	Switch condenser	Fin tube 4500m2/unit	8	Carbon steel
Phthalic anhydride purification	17	Crude phthalic anhydride storage tank	Vertical 200m3	4	Carbon steel
	18	Deaerator	--	2	Carbon steel
	19	Rectifying tower	Float valve tray	4	Stainless steel
	20	Thermal treatment tank	Vertical 45m3	6	Stainless steel
	21	Condenser	Tube type	4	Stainless steel
	22	Reboiler	Thermal siphon	4	Stainless steel
	23	Phthalic anhydride heater	Tube type	4	Stainless steel
	24	Air ejector	--	8	Stainless steel
	25	Pure phthalic anhydride storage tank	Horizontal 200m3	4	Stainless steel
Flaking and packaging	26	Flaker	Drum type	4	Stainless steel
Exhaust gas treatment	27	Regenerative oxidation device	--	1	--
	28	Ammonia desulfurization spray tower	--	1	--

Table 7-4 List of Key Storage and Transportation Facilities

SN	Name of equipment	Capacity (m3)	Qty (No.)	Remarks
1	Naphthalene tank	200	3	Fixed top tank, with steam heating, with nitrogen seal, with foam fire extinguisher
2	Phthalic anhydride storage tank	200	2	Fixed top tank, with steam heating, with nitrogen seal
3	Light component tank	200	2	Floating top tank
4	Naphthalene conveyance pump (including unloading pump)	--	6	With steam jacket
5	Phthalic anhydride pump	--	2	With steam jacket
6	Warehouse of solid phthalic anhydride products	2000m2	1 No.	--

4. Production Process

The phthalic anhydride project of Xingtai RISUN Chemical Industry Co., Ltd. uses liquid industrial naphthalene as the material, which is catalyzed and oxidized in air into phthalic anhydride and then condensed, recovered and rectified into rectified phthalic anhydride. See **Figure 7-11** for the flowchart and **Table 7-32** for the summary of pollutant emission points.

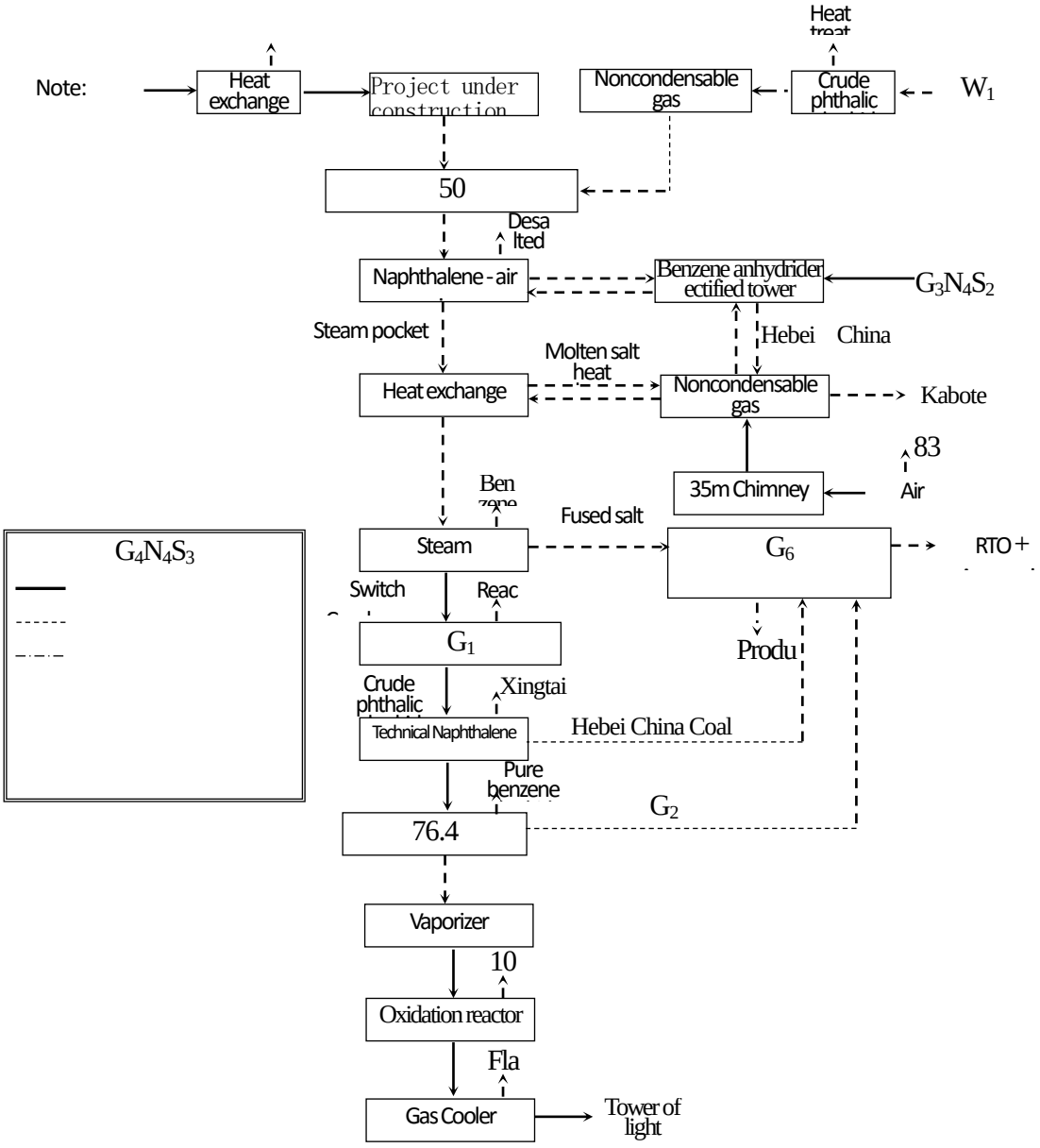


Figure 7-11 Technical Flowchart and Pollutant Emission Points of the Phthalic Anhydride Project

Table 7-32: List of Key Pollutant Emission Points of the Phthalic Anhydride Project

Pollution source	SN	Pollution source	Pollution factor	Management measure	Emission characteristics
Exhaust gas	G_1	Unorganized exhaust gas from the tank area	NMHC (naphthalene, phthalic anhydride)	–	Intermittent
	G_2	Noncondensable gas from switch condenser	CO, SO_2, phthalic anhydride, NMHC	Regenerative oxidizer + ammonium spraying + 35m exhaust tube	Continuous
	G_3	Noncondensable gas	NMHC (naphthalene,		Continuous

		from light component tower	phthalic anhydride)		
	G_4	Exhaust gas from vacuum system of rectifying tower	NMHC (naphthalene, phthalic anhydride)		Continuous
	G_5	Exhaust gas from flakers	phthalic anhydride dust	Bag-type precipitator+ 15m high exhaust tube	Intermittent
	G_6	Unorganized exhaust gas from production workshops	NMHC (naphthalene, phthalic anhydride)	Captured with the trap	Continuous
Wastewater	W_1	Wastewater from desalted water station	COD、SS	Delivered to and reused in China Coal RISUN wet quenching device	Continuous
	W_2	Wastewater from circulating cooling system	COD、SS	Partly used for landscaping and road spraying, equipment and floor washing, the remaining part used as regulating water at phenol cyanide wastewater treatment station of Hebei China Coal RISUN Coking Co., Ltd.	Continuous
	W_3	Equipment and floor washing water	pH、COD、SS	Used as regulating water at phenol cyanide wastewater treatment station of Hebei China Coal RISUN Coking Co., Ltd.	Intermittent
	W_4	Domestic sewage	COD, SS, NH3-N		Intermittent
Solid waste	S_1	Oxidation reactor	Waste catalyzer	Returned to and regenerated at manufacturer	Intermittent
	S_2	Light component tower	Light component residue	Delivered to qualified hazardous waste disposal unit	Intermittent
	S_3	Rectifying tower	Heavy component residue		Intermittent
	S_4	Ammonium desulfurization tower	Ammonium sulfate solution	Delivered to China Coal RISUN for treatment; ammonium sulfate for sale	Intermittent
	S_5	Domestic and office	Domestic solid waste	Delivered to landfill sites designated by local sanitation authority for disposal	Intermittent
Noise	N_1	Pumps	Noise	Foundation vibration absorption + workshop sound insulation	Continuous
	N_2	Blower fan	Noise	Silencer + workshop sound insulation	Continuous
	N_3	Compressor	Noise	Workshop sound insulation	Continuous
	N_4	Air ejector	Noise	Workshop sound insulation	Continuous
	N_5	Cooling tower	Noise	–	Continuous

5. Implemented Environmental Standards

A. Environmental quality standards

1) Ambient air: Class II standard specified in Ambient Air Quality Standard (GB3095-2012) applies to PM10, SO2, NO2 and CO; For NMTHC, the Ambient Air Quality – NMTHC limit value (DB13-1577-2012) shall be applied.

2) Surface water environment: Class V standard specified in Surface Water Quality Environment (GB3838-2002) shall be applied.

3) Ground water: Class III standard specified in Ground Water Quality Standard (GB/T14848-1993) shall be applied.

4) Acoustic environment: Class 2 zone standard specified in the Acoustic Environment Quality Standard (GB3096-2008) shall be applied.

B. Pollutant Emission Control Standards

1) Exhaust gas: Standards specified in Table 2 of "CO Emission Standard for Fixed Pollution Sources" (DB13/478-202) shall be applied to CO; Class II standards and monitored concentration limits for unorganized emission in Table 2 of the Air Pollutant Comprehensive Emission Standard (GB16297-1996) shall be applied to SO2, NMTHC and PMs; Class II

standards in Table 1 of the Odor Pollutant Emission Standards (GB14554-93) shall be applied for odor concentration.

2) Wastewater: Concentrated water from the desalinated water station shall satisfy the required limits of indirect discharge in Table 2 of the "Pollutant Emission Standard for Coking and Chemical Industry" (GB16171-2012); the other types of wastewater shall follow Class III standards in Table 4 of the "Wastewater comprehensive discharge standards" (GB878-96) and satisfy the influent quality requirements of phenol cyanide wastewater treatment station of Hebei China Coal RISUN Coking Co., Ltd.;

3) Noise: Plant boundary noises shall follow Class II standards in the Environmental Noise Emission Standard at the Boundary of Industrial Enterprises" while the construction noise shall follow the respective standards specified in the Environmental Noise Emission Standards at the Boundary of Construction Sites;

4) Solid wastes: a) Pollution Control Standards for Storage of Hazardous Wastes (GB18597-2001)；b) Pollution Control Standards for Storage and Disposal Sites of General Industrial Solid Wastes (GB18599-2001).

See **Table 7-33** and **Table 7-35** for the standard values of the aforesaid standards.

Table 7-33 Implemented Standard Values - Environmental Quality Standards

Environmental element	Name of pollutant	Test frequncy	Standard value	unit	Source of standards
Ambient air	PM (PM_{10})	Yearly average	70	μg/m^3	Class II standards in the Ambient Air Quality Standard (GB3095-2012)
Ambient air	NOx (NO2)	Yearly average	40	μg/m3	Class II standards in the Ambient Air Quality Standard (GB3095-2012)
		24-hour average	80		
		1-hour average	200		
	SO2	Yearly average	60		
		24-hour average	150		
		1-hour average	500		
	CO	Max. 8-hour average	4	mg/m3	
		1-hour average	10		
	NMTHC	1-hour concentration	2.0	mg/m3	Ambient Air Quality – NMTHC limit value (DB13-1577-2012)
Ground water	pH	--	6.5～8.5	--	Class III standards in Ground Water Environment Quality Standard (GB/T14848-1993)
	Total hardness (CaCO3)	--	≤450	mg/L	
	Permanganate index	--	≤3.0	mg/L	
	Total dissolved solids	--	≤1000		
	NH3-N	--	≤0.2		
	Nitrite (N)	--	≤20		
	Nitrate (N)	--	≤0.02	mg/L	
	Sulfate	--	≤250		
	Cyanide	--	≤0.05		
	Fluoride	--	≤250		
	Volatile phenol	--	≤0.05		
	Sulfide	--	≤0.2		Class III standards in Surface Water Environment Quality Standard (GB3838-2002)
Acoustic environment	Leq	Daytime	60	dB(A)	Class 2 zone in the Acoustic Environment Quality Standard (GB3096-2008)
		Nighttime	50		

Table 7-34 Pollutant Emission Standards - List of Implemented Standard Values

Type	Pollution source	Name of pollutant		Standard value	Unit	Source of standard
Exhaust gas	Process exhaust gas	SO_2	Emission concentration	550	mg/m^3	Class II, Table 2, Air Pollutant Comprehensive Emission Standard (GB16297-1996)
			35m high exhaust pipe emission speed	20	kg/h	
		NMTHC	Emission concentration	120	mg/m^3	
			35m high exhaust pipe emission speed	76.5	kg/h	
Exhaust gas	Process exhaust gas	PM	Emission concentration	120	mg/m^3	Class II, Table 2, Air Pollutant Comprehensive Emission Standard (GB16297-1996)
			15m high exhaust pipe emission speed	3.5	kg/h	
		CO	Emission concentration	2000	mg/m^3	Class II, Table 2 CO Emission Standards for Fixed Pollution Sources (DB13/478-2002)
			35m high exhaust pipe emission speed	115.5	kg/h	
		Odor	Plant boundary odor concentration	20	--	Class II standards, Table 1 Odor Pollutant Emission Standard (GB14554-93)
	Unorganized emission	NMTHC	Site with the maximum concentration in the surrounding	4.0	mg/m^3	Monitoring concentration limits for unorganized emission, Table 2, Air Pollutant Comprehensive Emission Standard (GB16297-1996)
Wastewater	Concentrated water from desalinated station	pH	Emission concentration	6～9	--	Indirect emission limits, Table 2 Pollutant Emission Standards for Coking and Chemical Industries (GB16171-2012)
		SS		70	mg/L	
		COD		150		
		NH_3-N		25		
Wastewater	Other wastewater in the plant area	SS	Emission concentration	400	mg/L	Class III standards, Table 4, Wastewater Comprehensive Emission Standards (GB8978-96)
		COD		500		
		NH3-N		--		
		Petroleum		30		
Noise	Plant boundary noise	L_{eq}	Daytime	≤60	dB(A)	Class 2 zone standards Environmental Noise Emission Standard for Boundary of Industrial Enterprises (GB12348-2008)
			Nighttime	≤50		

Table 7-35: List of Noise Emission Limits for the Boundary of Construction Sites

Unit: dB(A)

Daytime	Nighttime	Environment Noise Emission Standard for the Boundary of Construction Sites (GB12523-2011)
70	55	

6. Environment Management Body and its Basic Duties

Institutional Arrangement

Xingtai RISUN Chemical Industry Co., Ltd. has established a dedicated environment monitoring department responsible for internal environment management and monitoring activities in the company. Upon completion of the phthalic anhydride project, the existing environment monitoring department will be responsible for environmental management.

Basic duties of the environment management institution:

1) To enforce the Environmental Protection Law of the People's Republic of China as well as other related laws and regulations, to develop and supervise the execution of rules and regulations on environment management according to the national environment protection policies, environment standards and environment monitoring results.

2) To acquire and maintain information and data of treatment process, equipment and operation and maintenance of each pollution source as well as situation of comprehensive utilization of wastes and establish pollution control and management records and files.

3) To inspect the operation condition of the enterprise's environmental protection facilities, guide and organize the enterprise's environment monitoring activities; to develop emergency response and prevention actions and organize and properly implement pollution monitoring activities in case of any risky pollution emission, with causes analyzed and lessons and experiences summarized to prevent further occurrence of pollution accidents;

4) To determine the various pollution emission indicators of the production process and operational indicators of environmental protection facilities and carry out periodical assessment and statistical analysis;

5) To facilitate wide application of state-of-the-art environmental protection technologies and experiences, organize the enterprise's environmental protection technical training and education and promote the environmental protection awareness of company staff;

6) To supervise the installation and commissioning of the environmental protection facilities under the phthalic anhydride project and adhere to the "three-simultaneous" principle to assure that the environmental protection facilities are designed, constructed and put into operation simultaneously with the main works of the Project.

7. Pollutant Emission and Control

Sound management measures and corresponding purification facilities have been designed for the 2x40000ton/year phthalic anhydride project of Xingtai RISUN Chemical Industry Co., Ltd. as well as the pollutants to be emitted including CO, SO2, PM, NMTHC, odor, etc. It is thus estimated that no adverse impacts will be generated on the surrounding environment.

Concentrated water from the desalinated water station in the plant area satisfies the indirect discharge limits in Table 2 of the Pollutant Emission Standard for Coking and Chemical Industries (GB16171-2012); the water quality of the remaining part of wastewater can satisfy the influent water quality of the phenol cyanide wastewater treatment station of Hebei China Coal RISUN Coking Co., Ltd.. The wastewater is discharged into the phenol cyanide wastewater treatment station of Hebei China Coal RISUN and not discharged into the natural environment.

With a series of noise reduction measures taken, noise generated from the plant area process will not produce adverse impacts on the acoustic environment quality outside the plant boundary.

Based on the above analysis, the heat source enterprise (China Coal RISUN) and the backup heat source enterprise (RISUN Chemical) of the Subproject use state-of-the-art equipment and technologies and their environment management systems and pollution emission treatment facilities comply with the industrial requirements and the pollutant emission complies with the national and local emission standards. Therefore, China Coal RISUN and RISUN Chemical Industry are feasible heat source and backup heat source of the Project.

7.1.4 Zhangjiakou

According to the Heating Planning of Zhangjiakou City, Datang Zhangjiakou CHP Plant is the key heat source in Zhangjiakou City. So far, the CHP Plant has completed the heating renovation of No. 5 and No. 6 300MW turbine generator units and constructed one primary station. After renovation, the generator units achieve a single unit heating capacity of 279MW and a total heating capacity of 558MW, and are able to meet the heating need of a total heating area of 12,000,000m^2. In addition, the other 4 Nos. 300MW turbine generator units also have the possibility of renovation. In the end, when all 6 Nos. generator units are renovated, the total heating capacity will reach 1674MW to meet the growing heating need of Zhangjiakou City.

It is predicted that, along with the elimination of the large number of scattered and small

coal-fired boilers and the shut-down of the existing Dongyuan coal-fired boiler house as well as the growth of heating area, by the heating season of Year 2017, the DN1200 Shenghua Pipeline will no longer be able to meet the demand of heating load of the Project and by that time the Project will have a heating capacity gap of 2,000,000 to 2,400,000m2 in its heating area, requiring backup from other heat sources; in the meanwhile, fuel gas supply in Zhangjiakou City will be ready (upon the completion of the planned Shaanxi-Beijing Gas Pipeline) and the shut-down coal-fired boiler houses may be renovated into 2 Nos. 70MW gas-fired boilers to serve as the supporting heat source of the Project so as to assure the heating demand in the project area (See **Table 7-36** for the heat balance).

Table 7-36 Thermal Load Development Prediction and Heat Balance

Item	Year 2015		Year 2016		Year 2017		After Year 2017	
	Heating area (m^2)	Thermal load (MW)	Heating area (m^2)	Thermal load (MW)	Heating area (m^2)	Thermal load (MW)	Heating area (m^2)	Thermal load (MW)
Project heating area	445.1	258.2	793.2	460.1	848.9	492.4	848.9	492.4
Heating capacity of Shenghua Heating Network	0	0	700	406	620	359.6	620	359.6
Heating capacity of gas-fired boilers	0	0	0	0	228.9	132.8	228.9	132.8
Heat sources available in the Project	Existing coal-fired boilers		CHP (Shenghua pipelines)+ existing coal-fired boiler peak regulation		CHP (Shenghua pipelines)+ 2x70MW coal-to-gas boiler peak regulation		CHP (Shenghua pipelines)+ 2x70MW coal-to-gas boiler peak regulation	

In summary, the Project has two heat sources, i.e. Datang Zhangjiakou CHP Plant as the main heat source and Dongyuan Heating Co., Ltd. as the stand-by heat source. Therefore, the due diligence of the heat source enterprises will be presented separately for the two heat sources.

7.1.4.1 Datang Zhangjiakou CHP Plant (Main heat source)

1. Basic Information

Zhangjiakou CHP is located in the southeastern part of Shalingzi Town, Xuanhua County, with a center coordinate of E116°56′35.5″and N40°39′32.8″(as shown in **Figure 7-1**). Covering a land parcel starting at the foot of Dashankou of Xianzhi Mountain on the west and ending on the east at the west side of Zhujiazhuang Village of Hezixi Township, the CHP Plant is located approximately 16km away from Chengwu, Xuanhua County to the southeast, 14km from the urban center of Zhangjiakou City to the northwest and 170km from Beijing, the national capital. As an exclusively-invested power plant of Datang International Power Generation Co., Ltd., Datang Zhangjiakou Power Plant was commenced officially on June 20, 1987 and completed and put into production on August 27, 2001. Datang Zhangjiakou Power Plant has installed 8x300,000 kW home-made sub-critical condensation thermal power generator units with a total installed capacity of 2,400,000 kW and an annual power generation capacity of approximately 13 billion kWh, belonging to an extra-large power generation enterprise. Its key mission is to supply electricity directly to Beijing via the 500 kV Shachuang Double Circuit Line and in the meanwhile provide local electricity via a 220 kV line. It is the heat source enterprise of the Project.

2. Plant Area Layout

Datang Zhangjiakou Power Plant is divided into three principal parts, namely the power generation plant, the maintenance company and the industrial company. The power generation plant has 11 administrative departments and 1,686 employees engaged in the main business of power generation. The west-east Zhang-Xuan Highway cuts the plant area into the Production Area and the Domestic Area. The plant area is adjacent to Jing-Bao Railway. The ash yard is located in the valley nearby Yingpandi approximately 2km north of the plant area. See **Figure**

7-12 for the layout plan of the plant area of Zhangjiakou Power Plant.

Figure 7-12 Layout Plan of the Plant Area of Zhangjiakou Power Plant

3. Production Process

The production process adopted by Zhangjiakou Power Plant mainly uses steam generated by the boiler to drive the turbine generator unit, and the generated electricity is connected to the internal power distribution device and output via the transmission line. Heat-supply is achieved through generator unit steam extraction and a steam-water heat exchange primary station is provided in the plant area. Heat is supplied to the external users via the circulating water pump of the heating network as the heat source of the Project. Boiler flue gas enters the tail chimney and flows through the fuel economizer, denitrification device, the air preheater and the dust collection equipment and then the wet-type desulfurization device before discharged via the chimney.

4. Pollutant Emission and Control

(A) Overview

Zhangjiakou Power Plant has established its desulfurization control system (DCS), denitrification control system (DCS) and flue gas continuous emission monitoring system (CEMS). The FGD inlet pipes and chimney inlet pipes of the 8 generator units are respectively equipped with CEMS systems, which are in self-operation mode and already interconnected with the control center of the environmental protection authority according to the respective requirements. Following the environmental protection requirements, Zhangjiakou Power Plant has installed automatic online monitoring systems at inlets and outlets interconnected with the EPB Information Center, with environmental and pollution source monitoring conducted by Hebei Provincial Department of Environmental Protection. The aforesaid automatic monitoring systems comply with the Pollution Source Automatic Monitoring and Management Methods (SEPA Order No. 28) in terms of installation, operation and data effectiveness. According to Year 2014 Quarter 3 Report of Comparative Monitoring of Flue Gas Automatic Monitoring Equipment (System) of Fixed Pollution Sources in Hebei Province (JiHuanZai Doc. No. [2014]105), all the parameters of the 8 units of Zhangjiakou Power Plant comply with the standard requirements of the “Technical Specifications on Continuous Emission Monitoring of Flue Gas of Fixed Pollution Sources” (HJ/T75-2007).

In Zhangjiakou Power Plant, exhaust gas follows the requirements of “Thermal Power Plant Air Pollutant Emission Standard” (GB13223-2011); unorganized emission of PM follows the requirements of the “Air Pollutant Comprehensive Emission Standard” (GB16297-1996); unorganized emission of ammonia follows the requirements of “Odor Pollutant Comprehensive Emission Standard” (GB14554-93); plant boundary noise follows the Class III standard

requirements of the “Environmental Noise Emission Standard for the Boundary of Industrial Enterprises” (GB12348-2008); storage of general solid wastes follows the requirements of the Pollution Control Standard for the Storage and Disposal Sites of General Industrial Solid Wastes” (GB18599-2001); storage of hazardous wastes follows the requirements of the “Pollution Control Standard of Storage of Hazardous Wastes” (GB18597-2001). In the last three years, pollutant emission was in compliance with the standards.

(B) Air Pollutants

Exhaust gas emitted from Zhangjiakou Power Plant mainly includes flue gas generated by the boilers in the combustion process. The key pollutants contained therein include: smoke, SO2, NOx. Using a dual-chamber five-electric field static precipitator, flue gas generated in boiler combustion flows through the bag-type precipitator and then is delivered by the desulfurization booster fan into the desulfurization absorption tower, with a design dust collection efficiency of 99.6% and an actual operating efficiency of >99.6%. According to the data provided in the quarterly monitoring reports of Year 2014, flue gas at the outlet of the dust collection device has a smoke concentration of ≤14.7mg/m3. The flue gas, after dust collection and desulfurization purification, is emitted into the atmosphere via the 240m high chimney to effectively increase flue gas lift height and further reduce impacts on the neighborhood through dilution and diffusion in high altitude. In order to effectively control environmental pollution caused by emitted exhaust gas, the following measures are taken: 1) coal-borne sulfur content is controlled not greater than 1% and limestone-gypsum wet flue gas desulfurization process is adopted with a desulfurization efficiency of 90%. As of January 1, 2015, the concentration f smoke dust, SO2 and NOx follow the special emission limit. Online monitoring data shows that SO2 outlet concentration after desulfurization is ≤86mg/m3. Using the low-nitrogen combustion+SCR denitrification process and urea as catalyzer, the enterprise manages to meet the special emission limits for NOx emission concentration. Based on the data from the quarterly monitoring reports of Year 2014, the NOx outlet concentration is ≤68mg/m3. Zhangjiakou Power Plant has continuous emission monitoring system installed at the inlet and outlet of the desulfurization device for continuous and automatic monitoring the concentration of SO2, NOx, oxygen and smoke dust, flue gas humidity and temperature, and flow rate. All the signals input to the DCS for achieving continuous online monitoring. The boiler flue gas complies with the concentration limits specified in the Thermal Power Plant Pollutant Emission Standard (GB13223-2011), i.e. smoke dust concentration≤30mg/m3, SO2 concentration ≤200mg/m3 and NOx concentration ≤200mg/m3.

(C) Wastewater

Wastewater generated by Zhangjiakou Power Plant mainly includes production wastewater and domestic sewage. The production wastewater mainly includes boiler wastewater, boiler replenishing water and wastewater with coal from coal conveyance system washing, wastewater from main workshop washing, wastewater with oil, wastewater from boiler acid washing, etc. See **Table 7-37** for the volume and water quality of wastewater. The Power Plant has constructed its industrial wastewater treatment and domestic sewage treatment station. Domestic sewage treated at the domestic sewage treatment station is discharged into the industrial wastewater treatment plant; production wastewater is treated for reuse and not discharged into the environment. All four series of wastewater treatment equipment are in normal operation in the domestic sewage treatment station. Ash water is recovered by the ash water recovery system for fully closed reuse; washing water from the chemical water preparation system enters the neutralization tank and then into the ash washing pipeline for ash washing; coal conveyance wastewater is subject to coagulation and sedimentation treatment in the coal-containing wastewater treatment facility for reuse. Zhangjiakou Power Plant has one COD online monitoring instrument and the supporting environmental monitoring laboratory capable for measureing water temperature, pH, COD, SS and BOD5.

Table 7-37 Wastewater Quality and Volume of Zhangjiakou Power Plant

Item	Unit	Industrial wastewater	Domestic sewage
Water volume	10000 ton	725.7	25.8
Turbidity	NTU	14.6	53.1
SO_4^{2-}	mg/L	410	350
Total silicon	mg/L	36	23
Cl^-	mg/L	174	89
COD_{Mn}	mgO_2/L	2.24	8.89
Total Fe	ug/L	153.7	245.8
Hardness	mol/L	16.2	8.9
pH	No dimension	8.23	7.89
Electric conductivity	μs/cm	1230	2350
Alkalinity	mmol/L	7.8	6.3

(D) Solid Wastes

Solid wastes generated from Zhangjiakou Power Plant mainly include fly ash, furnace slag and desulfurized gypsum. Solid wastes including dust removal residue and desulfurized gypsum are fully for reuse. Fly ash, furnace slag and desulfurized gypsum respectively have a yearly production capacity of 1784691 tons, 252145 tons and 289350 tons. Fly ash and gypsum are collected and sold on a periodical basis while furnace slag is collected and landfilled. A reuse contract has been signed with Datang Tongzhou Technology Co. Ltd. Zhangjiakou Power Plant Subsidiary. Storage of general solid wastes complies with the requirements of the Pollution Control Standard for Storage and Disposal Sites of General Industrial Solid Wastes (GB18599-2001).

(E) Unorganized emission

Unorganized emission sources in the plant area mainly are coal dusts generated from the coal stockpile yards and the process of coal transportation, which are mainly controlled by means of wind shield and dust suppression walls, multi-tube impact precipitators, bag-type precipitators and automatic water spraying dust suppression devices, greenbelts and tarpaulin covering. These measures can effectively restrict the unorganized emission of dusts. Unorganized emission of PM complies with the Air Pollutant Comprehensive Emission Standard (GB16297-1996); unorganized emission of ammonium complies with the concentration limits specified in the Odor Pollutant Emission Standard (GB14554-93).

(F) Hazardous Wastes

Hazardous waste generated in Zhangjiakou Power Plant is mainly waste oil with a yearly production of 42.64 tons. The existing waste oil is temporarily stored in the waste oil tank on the east side of the plant area and delivered for treatment on a periodical basis to Zhangjiakou Jingyuan Grease Chemical Co., Ltd., which is the only environmental protection enterprise with the qualification for waste oil disposal in Zhangjiakou City and also a designated disposal service provider by the Environmental Protection Bureau. Storage of hazardous wastes complies with the stipulations in the “Pollution Control Standards for Storage of Hazardous Wastes (GB18597-2001).

It is stipulated in MEP Announcement No. [2014]54 --- Announcement on Issuing “the Guidelines on Review of Hazardous Waste Operation License for Waste Flue Gas Desulfurized Catalyzer” that organizations to be engaged in regeneration and utilization of flue gas denitrification catalyzer (vanadium) shall be applied for a hazardous waste operation license. Denitrified catalyzer has a

service life of 3-5 years and the Company has not generated any waste catalyzer so far.

(G) Noise

Noises in Zhangjiakou Power Plant mainly include mechanical dynamic noises (generated from operation and vibration of mechanical equipment), gas dynamic noises (generated from high-speed steam, air and flue gas flow process), electromagnetic noises (generated in the process of operation of motors, excitation motors, transformers and other electrical equipment due to strong changes of magnetic field), most of which being steady-state noises. The key noise control measures include source control, such as selecting low-noise equipment, and effective noise control measures such as sound insulation, silencing and installation of silencers and noise shields, etc. For the main workshops and pump stations, materials with excellent sound absorption performance and sound insulation windows and doors will be selected and seals will be used for the purpose of noise prevention. Coal crushers will be mounted on vibration-absorbing foundations to reduce vibration noise during the operation of coal crusher. Silencers will be installed at the inlet of blowers, primary fans and induced draft fans, the inlets and outlets of ash hopper vaporization blowers and other high-noise equipment and home-made new glass wool will be used as the damping material. Silencers will be installed at the inlet of air compressors and Roots blowers. Prevention of boiler steam discharge noise is an important part of noise prevention in power plants. Boiler steam discharge only happens upon boiler start-up, repair or accident. Silencers are installed at the safety steam discharge outlets, including the boiler steam discharge outlets, PVC valve, steam manifold, overheater outlet, reheater outlet and inlet. Vibration-absorbing devices are provided between the coal crusher and floor surface. At positions with significant impacts from coal flow, such as coal chute and coal hopper, impact-proof ceramic compound lining is used to increase wearing resistance and reduce noise. At the interfaces between equipment and ground or floor surface, vibration-insulating foundation or vibration-reducing devices with flexible connection are used to reduce spread of vibration and equipment noise. Soft and vibration-absorbing connectors are used for the various pump inlets and outlets to reduce spread of vibration and equipment noise. Plant boundary noise complies with Class 3 standards specified in the Environmental Noise Emission Standard for the Boundary of Industrial Enterprises" (GB12348-2008).

5. Environment Management

Zhangjiakou Power Plant has a complete management system and strict rules and regulations on environmental protection, strictly follows the national and provincial laws and regulations on environmental protection and turns over pollution emission fee in time and in full amount and carries out the environmental statistics and pollution emission declaration and registration work according to the requirements of the environmental protection departments. In the period from Year 2009 to 2011, the Power Plant carried out the wastewater recovery renovation activities, substantially realizing comprehensive reuse of wastewater for the Plant as a whole. The flue gas denitrification and eclectic dust collection renovation to all 8 generator units started in Year 2011 has been completed, contributing to the ahead-of-schedule realization of the energy-saving and emission reduction goals for the "12^{th} FYP" and "Double 30" Program agreed in the responsibility agreement with the Provincial Government. In addition, according to the special emission limits required by MEP, all the generator units in operation shall operate according to such special emission limits from 00:00 January 1, 2015; according to the requirements of JiHuanZong No. [2014]411 "Notice of Hebei Provincial Department of Environmental Protection on Taking Pollution Control Actions by Specified Deadlines against Key Pollution Emission Enterprises as Environmental Assurance for Beijing to Win the Bid of 2020 Winter Olympics", Zhangjiakou Power Plant initiated its environmental protection and renovation project regarding the emission limits of gas turbine generator units as of Dec. 26, 2014. In 2011, Round 1 clean production of Zhangjiakou Power Plant smoothly passed the acceptance organized by Zhangjiakou Municipal Environmental Protection Bureau; Round 2 clean production started in 2015 and is going on. Zhangjiakou Power Plant developed its Emergency Response Plan for Unexpected Environmental Accidents, which passed the assessment organized by Hebei Provincial Department of

Environmental Protection and was put on file in September 2012.

In order to assure that the environmental protection work is carried out in a standard way, Zhangjiakou Power Plant developed its Environmental Protection Management Methods based on the reality of Zhangjiakou Power Plant and according to the Environmental Protection Law of the People's Republic of China, the Electricity Law of the People's Republic of China and the Company Law of the People's Republic of China and the relevant requirements in the Environmental Protection Management Methods of Datang International. The "Methods" include two sections and thirteen articles and identified the targets and the job duties of environmental protection management (three-level environmental protection supervision and management network) and described in detail the environmental protection management procedure (environmental protection supervision and management procedure), requiring that any identified environmental protection issues are recorded in the Notice of Corrections Required for Environmental Protection Problems and corrections are made according to the respective requirements.

7.1.4.2 Zhangjiakou Dongyuan Heating Co., Ltd. (stand-by heat source)

1. Basic information

Zhangjiakou Dongyuan Heating Co., Ltd. is invested and registered by Dongshan Development and Investment Co., Ltd. with a registered capital of CNY 50,000,00. Belonging to Qiaodong District and adopting the enterprise management system, Zhangjiakou Dongyuan Heating Co., Ltd. is sited on a land parcel used to the campus of the Radio and TV University of Qiaodong District to the east of the Expressway, with Dongluyuan Residential Community located 150m away to its south and some scattered residential buildings of Qiaodong District Zhangjiakou City 245m away to its west. The Company was founded on Jan. 12, 2009 and started to provide heat in 2010, responsible for construction and operation of the district heating project covering the area north of Hanqiao Street and Shanzhongcheng Area. By the end of 2011, Dongyuan Heating Co., Ltd. had installed 4 x 64MW hot water chain boilers with a total heating capacity of 256MW and covering a district heating area of 4,000,000m^2. The Company has 96 employees, including 5 with senior technical title, 2 with intermediate technical title and 23 with technical professionals and operators with special skills.

2. Layout Plan of Plant Area

Dongyuan Heating Co., Ltd. has 4x64MW hot water chain boilers, the layout of which is shown in **Figure 7-13.**

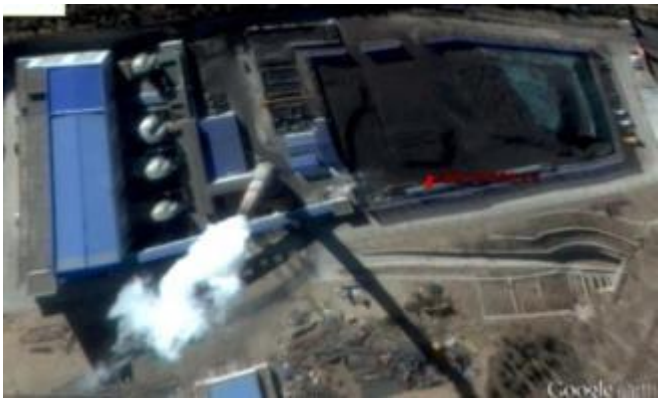


Figure 7-13: Plant Area Map of Zhangjiakou Dongyuan Heating Co., Ltd.

3. Production process

During the renovation to the desulfurization precipitator equipment and flue gas treatment system installed on the 4x64MW chain boilers, Dongyuan Heating Co., Ltd. renovated the existing equipment that integrates desulfurization with dust collection into the dry-type dust collection + MgO desulfurization process. In this process, a ceramic multi-tube precipitator is installed between the boiler outlet and the induced draft fan for dust removal of flue gas (negative pressure dust removal) and then use embedded scraper precipitator to convey dry ash emitted on the bottom of the ceramic multi-tube precipitator to the ash tank, where the ash is wetted by the wetting mixer before transported out of site. Flue gas after dust removal flows via the induced draft fan to the desulfurization tower, where three layers of circular sprayers are provided to spray MgO solution for desulfurization (positive pressure desulfurization).

4. Pollutant emission and control

A. Air pollutants

Locations where pollutants may be generated in the plant area include the slag bank, ash bank and chimney. The existing pollutant emission control indicators are: smoke emission concentration less than 80mg/Nm3 and SO2 emission concentration less than 200mg/Nm3.

At present, 4x64MW hot water chain boilers are being used for district heating in Qiaodong District and each boiler has 1 desulfurization and dust removal equipment, with the smoke emitted via one 80m high chimney. The boilers involve a coal consumption of 183593.75 t/a, with a sulfur content of 1% and a flue gas production of 4 x 1,116,000,000 m^3/a; the initial concentration and production capacity of smoke are respectively 1800mg/m^3 and 8035.2t/a; the initial concentration and production capacity of SO2 are respectively 699mg/m^3 and 3121t/a while those of NOx are respectively 120.9 mg/m^3 and 539.8t/a. After the boiler exhaust gas is treated in the dry-type dust removal + MgO desulfurization precipitator, the multi-tube desulfurization precipitator and the desulfurization tower can respectively achieve a dust removal efficiency of 95% and 90%, realizing a total dust removal efficiency of 99.5%; the desulfurization tower achieves a desulfurization efficiency of 90%; the SO2 emission concentration is 69.9mg/m3 and the emission volume is 312.1t/a; the smoke emission concentration is 9mg/m3 and the emission volume is 40.2 t/a; the NOx emission concentration is 120.9mg/m3 and the emission volume is 539.8t/a. The boiler exhaust gas can meet the requirements in the Boiler Air Pollutant Emission Standard (GB13271-2014), which specifies emission limits 80mg/m^3 for fume, 400 mg/m^3 for SO_2 and 400 mg/m^3 for NOx.

The dust removal equipment collects a part of the dust and ash during operation. The multi-tube desulfurization precipitator achieves a dust removal efficiency of 95% while the desulfurization tower achieves a dust removal efficiency of 90%, resulting in a total dust removal efficiency of 99.5%. Thus, totally 7995 t/a dust and ash are collected for comprehensive recycled.

B. Wastewater

Wastewater generated in the plant area mainly includes production and domestic wastewater. The production wastewater is reused and not discharged into the environment; the domestic sewage is sedimented in the septic tank as per the Class III standards specified in “Wastewater Comprehensive Discharge Standard” (and also the influent water quality standard of WWTPs) and then discharged in a centralized way into the municipal sewers and finally into Zhangjiakou Municipal WWTP for treatment.

C. Solid wastes

Solid wastes are for sale.

D. Noise

The main noise sources in this Subproject include boiler fans and pumps. Foundation vibration

absorption and boiler house insulation actions are taken based on the different natures and mechanisms of generation of such noises to reduce impacts on environment.

Sound insulation materials are selected in the design of boiler house walls. Boiler fans are located half-underground which sound insulation, silencing and vibration reduction measures are taken. Vibration isolators are installed at the inlet and outlet of water pump pipelines, and vibration absorption and reduction devices are mounted on pipeline base. The construction company should provide a 3m deep damping ditch outside the building walls south of the boiler house, which should be an open damping ditch filled with 18cm thick benzene boards. The filled damping ditch can be functioned as a barrier against the vibration radiated from the vibration source and generate reflection, dispersion and diffraction of the vibration wave as it reaches the barrier so as to reduce vibration.

E. Environment management system

Dongyuan Heating Co., Ltd. has developed the Safety Management Methods of Dongyuan Heating Co., Ltd. based on the relevant laws and regulations and stipulations. This document identified the objectives of safety management, constructed a safety management system (including safety steering organization and safety management organization) and specified strict safety management systems and requirements. The document requires that job responsibility system (including technical supervisor job responsibility system, boiler foreman job responsibility system, boiler fireman job responsibility system, equipment repairman job responsibility system, instrument operator job responsibility system, electrician job responsibility system, water treatment worker job responsibility system), shift duty system, inspection tour system, repair and maintenance system, operation record system, accident reporting system, boiler house safety and security system, water quality management system and safety response actions will be implemented. In addition, explicit rules and requirements were also established for work related to environmental protection.

F. Subsequent technological renovation

The key technological renovation task in the next step for Dongyuan Heating Co., Ltd. is to remove the existing 2x64MW coal-fired boilers in the plant area as of Year 2015 and reconstruct them into 2 x 70MW gas-fired boilers. Upon completion of the subproject construction, district heating area will be increased by 3,880,000m^2 and the emission of SO2 and smoke will be reduced significantly.

7.2 Due Diligence of Small Boiler Closure/Demolition

Closure/demolition of small boiler (boiler room) is involved in project cities except Pingshan.

The small boilers and boiler rooms to be demolished are listed in **Table 7-38.**

Table 7-38 Small Boilers/Boiler Rooms to Be Demolished

Subproject	Small Boilers/Boiler Rooms to Be Demolished
Chengde	6 boilers with capacity lower than 10 ton/hr in the project area
Pingshan	No
Xingtai	22 gas boiler rooms and 40 gas boilers with total capacity of 149 ton/hr will be upgraded.
Zhangjiakou	158 boilers with capacity lower than 10 ton/hr and total capacity of 441.64t/hr, and 99 boiler rooms located in 130 heating service communities. These small boilers will be closed. 41 small boiler rooms will be replaced by centralized heating exchange stations and the other boiler rooms will be redeveloped as community activity centers or garden.

Due diligence and assessment of small boilers (boiler rooms) related to 3 subprojects has been conducted to fully understand locations, amount, heating service area, and capacity. Potential

environmental impacts and mitigation measures have been analyzed.

Special attention was given during the project due diligence as to whether any hazardous insulation materials (asbestos or rock wool fabric, etc) are involved in the process of demolition. It is known from investigation that no asbestos, rock wool fabrics or any other hazardous materials are used for pipeline heat insulation of the small boilers.

7.2.1 Chengde Subproject

1. Basic information

In the subproject area, totally 6 independent and small coal-fired boilers located in 4 regions will be removed, involving a heating area of up to 146,600m^2. According to the site investigation, these small coal-fired boiler houses have no desulfurization facilities and the dust removal facilities are simple. As a result, both smoke and SO2 fail to meet the requirements of compliant emission. See **Table 7-39** for details.

Table 7–39: List of independent and Small Coal-Fired Boilers to be Removed in Chengde Subproject

SN	Name of community	Heating area of community (10,000m2)	Number of boilers (No.)	Boiler capacity (MW)
1	Minzu Middle School	6.66	2	3.5
2	Xinguanglian Internet Company	6.66	1	1.4
3	Meteorological Bureau	0.94	2	1.05
4	Water Supply Company Staff Residential Building	0.4	1	1.4

2. Demolition plan

The 4 boiler houses (and 6 small boilers) as involved will be removed in October 2015.

3. Environmental impact analysis and responsive measures

A. It is known from site investigation that asbestos is not used for pipeline heat insulation of the boilers to be closed / demolished. The main heat insulation materials to be used include polyurethane foam insulation materials and high-density polyethylene insulation materials. Therefore, no impacts from asbestos or rock wool fabric will be involved in the dismantling process.

B. Major environmental impacts generated in the process of small boiler house closure (demolition) include:

Demolished boiler auxiliary equipment, the remaining coal, and waste slag and ash, and pipeline insulation material may be produced during the demolition of boilers;

Suspended dust during demolition, loading/unloading and transportation of solid waste;

Noise caused by machines and equipment, loading/unloading and transportation, and workers.

C. Efficient measures should be taken to avoid dust suspension and noise：

Construction debris, furnace slag and ash, waste insulation materials will be stockpiled in a centralized way and transported to Chengde Municipal Construction Waste Landfill for centralized disposal;

Waste boiler equipment and auxiliary equipment will be sold to waste r recycling stations;

After the boiler is demolished, the boiler room will be cleaned

Measures of noise and dust reduction determined in the EIA of the Project will be implemented to reduce impacts of noise and dust on construction sites;

The boiler room will be handed over to the government or used by the heating entity for other purpose. The relevant information of boiler cancellation will be reviewed by local environmental departments.

4. Re-employment plan

A. Basic information of workers

The 4 small coal-fired boiler houses to be closed are administered by enterprises and public institutions, respectively located in the Staff Dormitory Buildings of the Water Supply Company and the Meteorological Bureau and Xinguanglian Internet Company and Minzu High School. Totally 18 boiler workers (all male) are directly affected. They are temporary workers having no labor contract with the employer. As seasonal workers, they are usually engaged in boiler maintenance during the heating season (from early November to mid-march the next year) and in other part-time jobs beyond the heating season. Questionnaires distributed to the 8 boiler workers reveal the following basic information:

1) These workers do not have high level of education and only have simple skills. Among the 9 interviewed boiler workers, 1 is illiterate, 5 are primary school graduates and only 2 have junior secondary school education background. None of them have vocational training certificate and their part-time job beyond the heating season are simple physical labor activities.

2) These workers have been working in the trade for a long time and are generally elder in age. Among the 8 interviewed boiler workers, 1 worker just started to work it he trade in 2014 and the other 7 have been working in the trade for more than 5 years, with 1 of them for more than 10 years. The 8 interviewed workers have an average age of 48.5, the oldest one is 59 years old and the youngest 39 years old.

3) These workers are the main bread earners of their families and their personal income takes a relatively large percentage of household income. The 8 interviewed boiler workers earn a monthly income of CNY 1500 to 2000, averaging CNY 1875 per person/month. Personal income takes a percentage of more than 60% in total household income. Mostly housewives with no fixed source of income, some of their spouses have to take medicine on a permanent basis for chronic diseases, bringing very huge financial pressure on their families.

B. Re-employment arrangements

Upon the completion of the Project, it will be necessary to increase the number of repair workers due to the increase of heating service objects. The heating group should consider providing such jobs to the boiler workers with priority. The city and district and enable the affected persons to be resettled through the aforesaid actions.

The Heating Group has promised to arrange all the 18 boiler workers on coal transportation and slag removal jobs at a monthly salary of more than CNY 1500 including insurance, higher than the minimum salary standard of CNY 1420 in Chengde City.

7.2.2 Xingtai Subproject

1. Basic information

This Subprojects utilizes residual heat of the process circulating water of China Coal RISUN to provide district heating to the northwestern part of Xingtai City and the gas-fired boilers in this area will be closed. It has been confirmed after site investigation and consultation with local government authorities that there are no small boiler houses in the heating area of the Project for removal and the existing gas-fired boilers will be renovated into heating stations.

Site investigation shows that 22 gas-fired boiler houses need to be renovated, involving 40 gas-fired boilers in total and affecting 81 boiler workers, mainly boiler operators and repair workers working on a seasonal and temporary basis. They work in the boiler houses in the 4-month heating season and look for other jobs on their own in the rest of the time. These workers may become pipeline inspectors, heating station administrators after training with new job opportunities provided to assure their income. See **Table 7-40** for the number of gas-fired boiler houses to be renovated and affected boiler workers.

Table 7–40 Number of Existing Gas-fired Boiler Houses to be Renovated and Affected Boiler Workers in Xingtai Subproject

SN	Name of community	Heating area (10000m2)	Number of boilers	Boiler capacity (t/h)	Number of boiler workers
1	Fengchaoyuan North Residential Community	5.2	2	4	4
2	Fengchaoyuan Residential Community	20.1	2	10	9
3	Yihai Garden Residential Community	3.1	1	6	2
4	Gaojiatun Residential Community	7.97	2	6/4	4
5	YUzhuyuan Residential Community	6.4	2	3	4
6	Beiguozhuang Residential Community	3.65	1	6	2
7	Quanbeiquan Residential Community	2.63	1	2	2
8	No. 3 Middle School Residential Community at Beiguozhuang	0.79	1	1	2
9	Staff Residential Buildings of Xingtai County State Tax Administration	1.26	1	2	1
10	Staff Residential Buildings of Xingtai County Health Bureau, Drug Supervision Bureau	2.8	1	4	1
11	Fangyuan North Residential Community	3.26	1	6	2
12	Shui’anlanting Residential Community	10.38	2	6	5
13	Fangyuan West Residential Community	3.57	1	6	2
14	Tuanjiedongyuan Residential Community	1.26	1	2	1
15	Tuanjiedongyuan West Residential Community	2.1	1	3	1
16	YI’an Garden Residential Community	6.86	5	1	7
17	Oriental Grand Villa Residential Community	13	4	6/4/3	9
18	Nature City Phase II	10.83	2	4/8	4
19	Quanducheng Residential Community	4.5	1	3	2
20	Tangning No. 10 Residential Community	11.5	2	4/6	4
21	Kongfu Garden Residential Community	15	4	4	9
22	Xingtai TVET College	4	2	2	4

2. Renovation plan

Upon the completion of the Project, all gas-fired boiler houses will be shut down and replaced with heatingl stations.

3 . Environmental impact analysis and responsive measures

A. It is known from site investigation that asbestos is not used for pipeline heat insulation of the boilers to be closed / demolished. The main heat insulation materials to be used include polyurethane foam insulation materials and high-density polyethylene insulation materials. Therefore, no impacts from asbestos or rock wool fabric will be involved in the dismantling process.

B. Environmental impacts generated in the process of small boiler house renovation mainly include:

Demolished boiler accessories, waste pipeline insulation material may be produced during the demolition of boilers；

Suspended dust during demolition;

Construction noise to be generated during construction of renovation works.

C． It is necessary to take effective measures during the construction of the renovation works to avoid or reduce dust and noise impacts;

Furnace slag, ash and waste insulation materials should be stored in a centralized way and then transported to Xingtai Municipal Solid Waste Landfill for centralized disposal;

Waste equipment and units should be sold to waste recycling stations;

Noise reduction measures specified in the EIA of the Project should be implemented to mitigate impacts of noises from construction sites.

4. Re-employment plan

Upon implementation of the Project, the laid-off boiler workers will be re-employed by the following means:

a) The 8 boiler workers who used to work for the local property management company (they are employees of the property management company and operate boilers on a part-time basis during the heating season) will be arranged to continue work as property management staff.

b) The other 73 boiler workers will be employed by the project employer because totally 60 new job positions will be generated related to mechanical, electrical and instrumental repair and maintenance and safeguarding of the heating pipelines, primary heating stations and heating stations and approximately 40 heating station inspectors will be needed during winter. These boiler workers have been working in this trade for a long time and have certain repair and maintenance technology and rich work experience and, in addition, they are familiar with the situations of residents and heating pipelines in the various communities. Therefore, RISUN Anneng Heating Co., Ltd., as the project employer, will employ and provide training to all the boiler workers who are willing to stay to take the relevant jobs.

As indicated in the Social Impact Assessment Report for World Bank Financed Xingtai Industrial Waste Heat District Heating Project, both the boiler house owners and the boiler house workers are supportive to the construction of the Project.

7.2.3 Due Diligence of Small Boiler House Closure under Zhangjiakou Subproject

1. Basic information

In the subproject area, the existing heating area is approximately 6,071,000m2, including 3,485,000m2 of which has realized district heating. The remaining 2,587,000m2 relies on scattered small boilers for heating. Upon the implementation of the subproject, the CHP heat source of Zhangjiakou Power Plant will be used to replace the existing scattered small coal-fired boiler houses in Qiaodong District for providing winter heating sources for residential and public buildings in the planned area of Qiaodong District. Upon the completion of the Project, coal-fired boiler houses in the region will be closed.

In the construction area of the Subproject, there are totally 99 small boiler houses (See **Figure 7-14** for distribution of such coal-fired boilers) and 158 small boilers with a total boiler capacity of 441.64t/h, a total heating area of 2,587,000m2 covering 130 heating communities. Along with the construction of the subproject, these scattered small boilers will be fully closed and 41 of them will be renovated into district heating exchange substations or offices for heating pipeline management and maintenance staff. Other boiler houses will be returned to their owners and renovated into community activity centers or demolished and constructed into green belts or gardens.

Figure 7-14 Layout Plan of Small Coal-fired Boiler Houses in the Subproject Area

2. Demolition Plan

The existing 158 small boilers will all be closed in three phases along with the construction progress of the Project: (1) self-closure and demolition: the Qiaodong District Government will organize the concerned units to close and demolish their coal-fired boilers on their own; (2) centralized closure and demolition: headed by Qiaodong District Government, the concerned government departments will be organized to implement joint law enforcement campaign to close and demolish and confiscate the combustion facilities of the coal-fired boilers that remain not closed and demolished beyond the deadline of the self-closure and demolition phase; (3) inspection and acceptance: the municipal and district people's governments will organize the concerned government departments to carry out inspection and acceptance process of coal-fired boiler closure and demolition status.

It is predicted that 23 small boilers will be closed in Year 2015, 116 in Year 2016 and remaining 19 in Year 2017. See **Table 7-41** shown statistics and closure of small boiler houses.

Table 7–41: Small Coal-fired Boiler Closure Plan of Zhangjiakou Subproject

Ref. No. of Small Boiler Houses	Name of Heating Community	Building Area (m2)	Population	Boiler Capacity (t/h)	Boiler Number	Siting of heating station	Boiler house plan	Demolition plan
1	Wuyi Road Backstreet Building No. 1, 2, 3, 4 and New- 5	18872		2	2		To be closed	2016
	Building No. 10		835					2016
2	Kaiheng Property (Fuan Street Building No. 9)	48280	2136	10	1	Construction of heating station		2016
	Huanyuan Community Building No.17-31	40730.51	1802	4	1			2016
	Fu'an South Street Building No. 1 and 2	5383.98	238	2	1			2016
3	Zhonghouli Building No. 7, 8	4605	204	2.5	1	Construction of heating station		2016
4	Zhonghouli Building No. 5, 6	2235	99	1.4	1		To be closed	2016
5	Zhonghouli Building No. 1	1246	55	0.75	1		To be closed	2016
6	Xiandai Property (between Shiqingli No. 1 Building and No. 2 Building)	26129.2	1156	6	1	Construction of heating station		2016
7	Tiexie Primary School Campus	10000		2	1		To be closed	2016
8	Rescue Station	2000		1.5	2	Construction of heating station		2016
9	Catholic Church	1500		1	1		To be closed	2016
	Staff Dormitory Building of the prosecutorial office	5750		4	1	Construction of heating station		2016
10	Railway Community No. 1 (Construction Section of Beijing Railway Bureau)	9062	401	4	1		To be closed	2016
11	Kaiheng Property (Tuergou Community)	110242	4878	10	1		To be closed	2016
12	Kaiheng Property (Tieluxie Street)	30000	1327	10	1	Construction of heating station		2016
	Shengbei Garden, behind Building No. 14	95300	4217	10	1			2016
	Shengbei Garden, behind Building No. 14	15000	664	6	1			2016
13	In Building Block No. 90	95300	4217	6	1		To be closed	2016
14	Municipal Planning Bureau	11000		1	1	Construction of heating station		2016
15	Planning and Design Institute	10000		1	1		To be closed	2016
16	Beijing Railway Section (Lianchuang Plaza)	152077	6729	10	2		To be closed	2016
17	Junei Community Building No. 8	11705	518	1.5	2		To be closed	2016
18	Zhangjiakou Chunyu Property Management Service Co., Ld.	270000	11947	10	2	Construction of heating station		2016

	Bus Line No. 9 terminal station, Lingyuan South Street No. 6	3000	133	0.5	2		To be closed	2016
19	Post Office Staff Dormitory Building (to be put into service)	1779.52	79	2	1	Construction of heating station		2016
	Post Office Staff Dormitory Building at No. 2 Lingyuan South Street	23000	1018	2	1		To be closed	2016
20	577 Regiment at No. 8 Lingyuan Road	12500		2	1	Construction of heating station		2016
21	Paint Factory at No. 4 Lingyuan North Street	1000	44	0.5	8		To be closed	2016
22	Qiaodong Local Taxation Bureau	2700		0.79	1		To be closed	2016
23	Yijunge Commercial Hotel	200		1	1	Construction of heating station		2016
24	Railway No. 2 (Beijing Railway Bureau)	68351	3024	6	2		To be closed	2016
25	Kaiheng Property Management (Dong'an Street, Taipingqiao)	15000	664	6	1		To be closed	2016
	Beside 147 Billiard Club	5000	221	2.5	1		To be closed	2016
	Dongan	41500	1836	2	2		To be closed	2016
26	In Staff Dormitory Area of No. 251 Hospital	35000	1549	10	2	Construction of heating station		2016
	In Staff Dormitory Area of No. 251 Hospital	20000	885	6	1			2016
27	Air force staff dormitory area	70000	3097	4	3	Construction of heating station		2016
28	Zhongbao Residential Community	72000	3186	6	2	Construction of heating station		2015
29	Kaifa Staff Dormitory Area	14600	646	2	1	Construction of heating station		2015
30	Municipal No. 7 Construction Company	2542.5	113	1.5	1		To be closed	2016
31	Zhangjiakou Coal Gas Corporation	5000		1	1		To be closed	2016
32	China Unicom Network Communication Co., Ltd.	15700		7	1		To be closed	2015
	Zhangjiakou Branch						To be closed	2015
33	Staff dormitory area of Agriculture College	10294	455	1.5	1		To be closed	2015
34	Staff dormitory area of Teacher's College	17800	788	3	1	Construction of heating station		2015
35	Staff dormitory area of ICBC	12100	535	4	1		To be closed	2015
36	New campus of No. 7 High School	13000		4	1		To be closed	2015
37	Zhangjiakou Transportation Bureau	5000		2	1		To be	2015

							closed	
38	Staff dormitory area of Food and Grain Depot	26000	1150	2	1		To be closed	2016
39	Staff dormitory area of Petroleum Company	7326	324	4	1		To be closed	2016
	Shengshihuating Residential Community, Wujiaohua Residential Community	22039	975	4	1	Construction of heating station		2016
	Jiahe Residential Community	7181.05	318				To be closed	2016
	Jinsha Residential Community	10131.03	448				To be closed	2016
	Staff dormitory area of fuel company	5284	234				To be closed	2016
40	Railway Residential Community and Meihuixian Residential Community at Shengnan No. 23	33217	1470	4	1		To be closed	2016
	(Beijing Railway Bureau)		0				To be closed	2016
41	Staff dormitory area of Post Office	13024	576	1.5	2	Construction of heating station		2015
42	Tianlunjiayuan Community	11498	509	2	1	Construction of heating station		2015
43	Staff dormitory area of ICBC at Wuyihou Street 15	5390	238	1.5	1	Construction of heating station		2016
44	No. 22 Wuyihou Street (Staff dormitory area of Qiaodong District CCP Committee)	1789	79	1	1		To be closed	2016
45	Dongan Street No. 8, Shenglu North Road No. 69	14200	628	4	2	Construction of heating station		2016
46	Staff dormitory area of No. 251 Hospital	36949	1635	6	2		To be closed	2016
47	Staff dormitory area of Water Conservancy Bureau and Animal Husbandry Bureau	1100.25	49	0.5	1		To be closed	2016
48	Jianguo Road No. 37 (Staff dormitory area of China Unicom)	3564	158	1	1		To be closed	2015
49	Jianguo Road No. 38 (Staff dormitory area of Finance Bureau)	21500	951	6	1	Construction of heating station		2015
50	Shengli North Road No. 77 (Staff dormitory area of Military Carder Resting Station)	4550	201	1.5	1	Construction of heating station		2016
51	PBC Zhangjiakou Central Branch	15000		6	1		To be closed	2016
	Wuyi Street No. 99 (Staff dormitory area of PBC)	23286	1030	6	1		To be closed	2016
52	Wuyi Street No. 97 Staff dormitory area of Commercial Bank	3333	147	1	1		To be closed	2016
	Wuyi Street No. 97	8407	372	2	1		To be closed	2016
53	Longteng Garden Community	65000	2876	10	1	Construction of heating		2016

						station		
54	Earthquake Center Station	1800		0.5	1		To be closed	2016
	Staff dormitory area at Linyuan West Street No. 7	30000	1327	10	1	Construction of heating station		2016
55	Zhangjiakou Municipal Water Supply Corporation	30000		11	1	Construction of heating station		2016
56	Zhangjiakou No. 10 Middle School	25000		10	1	Construction of heating station		2015
57	Martyr's Tombs at No. 7 Lingyuan Road	3000		2	1		To be closed	2016
58	Linyuan Road Branch of Zhangjiakou Commercial Bank	30000		2	3		To be closed	2015
	(Linyuan West Street No. 9)						To be closed	
59	Zhangjiakou Dalishen Boiler Manufacturing Co., Ltd.	5800		4	1	Construction of heating station		2016
60	Dongzheng Construction Material Aerated Block Factory	10000		4	2	Construction of heating station		2016
61	Mingchen Garden Residential Community	20000	885	6	1		To be closed	2016
62	Industrial Equipment Installation Company	2000	88	1	1	Construction of heating station		2016
63	Dong'an Block 1 Building No. 3, 4, 6; Building at No. 10 Jiefang Street	17333	767	2	1	Construction of heating station		2016
64	Shangyuan Community	44564.77	1972	4	2		To be closed	2016
65	State-owned-asset Committee	2232		1	1	Construction of heating station		2016
66	Price Bureau	4087		1	1		To be closed	2016
67	Zhangjiakou Hotel	12940		6	1	Construction of heating station		2016
68	Municipal Workers Union	30466.6		10	1	Construction of heating station		2016
69	Chengjiao Cooperative	8371.94		2	1		To be closed	2016
70	Century Supply and Sales Cooperative	26552.98		4	1		To be closed	2016
71	Beicaiyuan No.8, 9, 10, 11, 13, 14	21990.27	973	4	1		To be closed	2016
72	Railway Building No. 1 and 2 (Beijing Railway Bureau)	11120.75	492	2	2		To be closed	2016
73	Zhangjiakou Construction Bank / Malu Street Kindergarten	7854.82	348	2	2		To be closed	2016
74	Building No. 7 and 8, Dongan Street Block 1	6400	283	2	1	Construction of heating		2016

						station		
75	Zhonghouli No. 9	3375	149	2	1		To be closed	2016
	No. 138 Wuyi Street (Staff Dormitory Building of Qiaodong District Education Bureau)	11865	525	1	1		To be closed	2016
76	Zhonghouli Building No. 3, 4	5260	233	1	1		To be closed	2016
77	Building No. 18 and 22 at NO. 1-5 Dama Road	18000	796	4	1		To be closed	2016
78	Building No. 1-6, Automobile Company, Pharmaceutical Plant Staff Dormitory Building	13607.72	602	3	1	Construction of heating station		2016
	Zhangjiakou Jianguo Hospital	15000		6	1			2015
79	China Unicom (Post Hotel)	8158.08		1	2		To be closed	2016
80	Xinhua Bookstore staff dormitory building	10000	442	2	1		To be closed	2017
81	ICBC Zhangjiakou Branch	14500	642	4	1		To be closed	2017
	(ICBC Staff Dormitory Building)		0				To be closed	2017
82	Zhangjiakou Zhongnan Construction Material Factory	1200		0.2	1		To be closed	2017
83	Wuyi Road Front Street Building No.10 (Municipal Science Association staff dormitory building)	8941	396	2	1	Construction of heating station		2016
84	Management Section of the People's Congress of Zhangjiakou City	20000		4	1		To be closed	2016
85	Chinese Traditional Medicine Hospital and staff dormitory buildings	20000	885	6	1	Construction of heating station		2016
	Department Store	20000		4	1		To be closed	2016
86	Dongsheng Hotel	16250		6.5	1	Construction of heating station		2015
87	Zhangjiakou Hengtong City Hotel Co., Ltd.	2500		1	1		To be closed	2015
88	Staff dormitory building of Bank of Commerce	12000	531	7	1		To be closed	2016
89	Fulihua Hotel	6000		1	1		To be closed	2016
	China Construction Bank Co., Ltd.	15000		6	1		To be closed	2016
	Zhangjiakou Branch Bank						To be closed	
90	Staff Dormitory Building of Recovery Company (Old Building No. 5 and 6 of Wuyilu Backstreet, Building No. 70-74 of Shengli North Road)	8100	358	1.5	1		To be closed	2016
91	Premises of Army Group No. 65	73160	3237	5	6		To be closed	2017
	Zhangjiakou Municipal State Taxation Bureau	10000		4	1		To be closed	2017
	Staff Dormitory Building of the Municipal CCP Committee (to be put	18656.53	826	4	1		To be closed	2017

	into service)							
	Office and Staff Dormitory Buildings of the State Taxatoin Bureau	20755.31	918	4	1		To be closed	2017
92	Filling Station of Army Group No. 65	4200		0.5	3		To be closed	2017
	Staff Dormitory Building of the Communication Regiment, Chemical Prevention Battalion of Army Group No. 65	21000		1.5	2		To be closed	2017
93	Zhangjiakou Luxing Ecology Co., Ltd.	15000	664	6	1	Construction of heating station		2017
94	Zhangjiakou Municipal Blood Center	6775.68	300	2	1		To be closed	2017
95	Staff Dormitory Building of Traffic Police Brigade	17250	763	2	1		To be closed	2015
96	Staff Dormitory Building of Public Utility Administration Bureau	1500		1	1		To be closed	2015
97	Medicine Company Staff Dormitory Building	11907.07	527	2	1	Construction of heating station		2016
98	Qiaodong District No. 3 Kindergarten	7500		2	1		To be closed	2016
99	China Coal Zhangjiakou Coal Mine Machinery Co., Ltd. Spare Part Manufacturing Co., Ltd.	15000		6	1		To be closed	2016
	Total	2587229	93996		158			

3. Environmental impact analysis and responsive measures

A. It is known from site investigation that asbestos is not used for pipeline heat insulation of the boilers to be closed / demolished. The main heat insulation materials to be used include polyurethane foam insulation materials and high-density polyethylene insulation materials. Therefore, no impacts from asbestos or rock wool fabric will be involved in the dismantling process.

B. Environmental impacts generated in the process of closing (dismantling) the small boiler houses mainly include:

Demolished boiler accessories, pipeline insulation material, the remaining coal, and waste slag and ash may be produced during the demolition of boilers;

Suspended dust during demolition, loading/unloading and transportation of solid waste;

Noise caused by machines and equipment, loading/unloading and transportation, and workers

C. During demolition, it is necessary to take effective measures to avoid or reduce dust and noise impacts;

Construction wastes, waste slag and ash and waste insulation materials are stored in a centralized way and shipped to Zhangjiakou City Construction Waste Landfill for centralized disposal;

Waste boiler equipment and auxiliary devices are sold to waste recycling stations;

After the boiler is demolished, the boiler rooms will be cleaned.

Construction site noise and dust reduction measures determined in the Project EIA are implemented to reduce noise and dust impacts;

The boiler room will be handed over to the government or used by the heating entity for other purpose. The relevant information of boiler cancellation will be reviewed by local environmental authority.

4. Re-employment Plan

A. Basic information of workers

The 99 small boiler houses to be dismantled involve totally 259 workers in the heating season of Year 2014 to 2015 (254 men and 4 women), including stokers, coal transportation and operation workers, repairman and choreman. These workers are employed on a temporary and seasonal basis. They work in the boiler houses in the 5-month heating season and seek other jobs in the rest of the year.

The adverse impacts generated from closure of the boiler houses mainly affect those who have been working in the boiler houses for many years. These workers, although are very skilled boiler operators working on the same job position for a long period of time, are generally senior workers and have relatively simple skill thus finding it difficult to get accustomed to other jobs and get reemployed. Losing jobs at the boiler houses also generates relatively significant impacts on their family income.

B. Re-employment arrangements

The project employer, Qiaodong District Government and the concerned street offices will meet the needs of the boiler house workers by the following means:

(1) Upon completion, the Project will accept most of the male boiler house workers for reemployment;

It is preliminarily estimated by Dongyuan Heating Co., Ltd. that, upon the completion of the Project, work load will increase in the aspects of community pipeline maintenance, customer indoor pipeline maintenance, routine maintenance of heating station during the operation period as that 200 to 300 additional workers will be needed. These jobs may be provided to workers from the 99 demolished boiler houses.

(2) Suitable job opportunities will be provided to females after the Project is completed.

After the Project is put into operation, it is still necessary to increase the number of customer service and cleaning jobs, which will be provided to affected female boiler workers with priority.

(3) Reemployment Training

Dongyuan Heating Co., Ltd. is responsible for the technical training of new employees and helping them adapt to new jobs as soon as possible. If the boiler workers want to learn other practical techniques or want to find other jobs, Dongyuan Heating Co., Ltd. is responsible for contacting the city employment service bureau and provides them with training opportunities and employment information. The district government, street office and community leaders in the Project Area also express their desire to provide employment information for these boiler workers with their best efforts.

8. Alternatives Analysis

Alternatives to be analyzed here are mainly those that have been discussed and compared in the feasibility study report. This analysis will focus on the environmental impact and the pros and cons of different options and finally select out the optimized option that is environmental friendly.

For the project, alternatives of 1) 'with project' and 'without project', 2) heat source, 3) location of heat exchange substation and 4) heating network layout are compared.

8.1 Comparison of 'With Project' and 'Without Project' Alternatives

The environment impact and advantages of 'with Project' and 'without Project' scenarios are analyzed and compared from engineering technology, environmental and social impact, cost and other perspectives. Please refer to **Table 8-1** for analysis and comparison of advantages and disadvantages of the two alternatives.

Table 8-1 Comparison of 'With Project' and 'Without Project' Alternatives

Alternatives **Comparison contents**		**With Project**	**Without Project**
Technology	Technical feasibility	Feasible	Nonsense for discussion
	Construction conditions	Satisfied	Satisfied
	Construction difficulty	Low	Nonsense for discussion
	Construction period	Short	None
	Operation and maintenance	Simple and light workload	Complex and heavy workload (because of the small boiler room)
Environmental impact	Impact on environmental sensitive sites	Great	None
	Soil erosion	Little	None
Social impact	Households and people to be relocated	None	None
	Land occupation (0,000 m^2): permanent and temporary	Some temporary and few permanent land occupation	None
	Arable land occupied (0,000 m^2)	None	None
Cost	Land acquisition cost (CNY/mu)	Yes	None
	Environmental costs	Low (closing the small boiler room may reduce emissions)	High (relatively high emissions)
	Construction investment	High	None
Social and environmental advantages		1) It may increase the district heating area and improve the energy efficiency; 2) it may improve the local livable condition; 3) it will replace decentralized small coal-fired heating boiler rooms in areas where the sub-project locates to reduce coal consumption and emissions of air pollutants; 4) it may improve the environment and be conducive to promote the economic development	1) There will be no environmental impacts, i.e. dust and noise, in the construction and operation period caused by construction of the project; 2) no land will be temporarily and permanently occupied; 3) there will be no pressure on investment
Social and environmental disadvantages		1) The construction of the project will cause environmental impact (noise and dusts) and traffic impact; 2) there will be slight noise in the operation period; 3) there will be some temporary and few permanent land occupation; 4) with closure of the	1) The decentralized small boiler supplies low-quality and unstable heat; 2) decentralized heating will cause more emissions and more serious environmental pollution; 3) a lot of new residential buildings will not have heat

	small boiler room, it needs to resettle unemployed boiler room workers.	supply in a timely manner; 4) the urban residents' living quality will be impacted; 5) there will be adverse impact on improvement of the local environment and urban construction.
Conclusion	The alternative "With Project" will be better than "Without Project" from the social and environmental perspective.	

From **Table 8-1**, there will be no environmental impact during the construction and operation period without the project, but the low-quality and unstable heat supply, relatively high pollutant emission and negative impact on the improvement in the local environment and the construction of livable city will continue. The construction of the Project may cause noise and dusts and other environmental impacts, but they will be short-term and appropriate mitigation measures can be taken to avoid or minimize them. During the operating period, the Project will impose extremely small impact on the environment. It will be free of irreversible environmental impacts during the construction and operation period. Meanwhile, the Project may increase the area of district heating and reduce the air pollutant emissions and will be conducive to improve the environment, improve the living quality of urban residents and promote the local economic development. In all, the Project will bring long-term social and environmental benefits. Therefore, the construction of the Project will be necessary based on the above comprehensive analysis and comparison.

8.2 Alternative Comparison of Heat Sources

For each of the four subprojects, two or more heat sources are proposed for comparison. Two heat source options are selected for Chengde, Pingshan and Zhangjiakou Subproject, while three heat source options are selected for Xingtai Subproject.

1. Chengde

For Chengde Subproject, two heat source options are selected for comparison according to the heating system status, planned heat capacity at gas peak, available natural gas, heat demand and construction progress of new heat loads in the old town of Chengde. See **Table 8-2** for details.

Table 8-2 Alternative Comparison of Heat Sources for Chengde Subproject

Alternatives **Comparison contents**		**Option 1**	**Option 2**
Option contents		To connect the new heat load to the existing district heating system in the form of cogeneration to achieve district heating of a new heat load in form of cogeneration	To construct a few of small gas-fired boilers in the area of new heat load
Technology	Technical feasibility	Relatively simple and feasible	Relatively complex, but feasible
	Construction conditions	Satisfied	Not fully satisfied
	Construction difficulty	A few of equipment is required with low difficulty in construction.	Much equipment is required with relatively high difficulty in construction.
	Construction period	Short	Relatively long
	Operation and maintenance	Few maintenance at few places	Heavy maintenance workload at many places
	Heat source	Waste heat	Natural gas
Environmental impact	Impact on environmental sensitive sites	Little impact	Great impact
	Soil erosion	Tiny	Little
	New emissions	No exhaust gas will be generated	The natural gas boiler for heating supply may additionally consume natural gas for 29.91 million m3/a and generate sulfur dioxide emissions for 1.09t/a and nitrogen oxide

			emissions for 55.97t/a.
Social impact	Households and people to be relocated	None	None
	Land occupation (0,000 m^2): permanent and temporary	No fuel yard and solid waste yard are needed; both the residential heat station and the project only occupy small area.	A plant shall be constructed for each gas-fired boiler with the boiler room and the overall project will occupy large areas.
	Arable land occupied (0,000 m^2)	None	None
Cost	Land acquisition cost (CNY/mu)	Low	High
	Environmental costs	Low environment protection investment and low operating cost	Relatively high environment protection investment and relatively high operating cost
	Construction investment	High	High
Safety and stability		It will be a heat supply based on CHP and supplemented by regional peaking heat source with high supply safety and stability	Decentralized small gas boiler room cannot guarantee the safety and stability of heat supply in the case of failure and overhaul due to single form of heat supply without a standby heating system
Conclusion		Option 1 needs no investment for new heat source, which can shorten the construction period and avoid land acquisition, but can guarantee the safety and stability of heat supply. In terms of the technology, environment, cost and social impact, Option 1 is better than Option 2.Therefore, Option 1 is recommended.	

2. Pingshan

Two heat source options are selected for comparison for Pingshan Subproject. See **Table 8-3** for details.

Table 8-3 Alternative Comparison of Heat Sources for Pingshan Subproject

Alternatives **Comparison contents**		**Option 1**	**Option 2**
Option contents		Take Xibaipo Power Plant (waste heat) as the heat source for district heating	Construct regional gas-fired boilers for heating
Technology	Technical difficulty and feasibility	A few of equipment are required with low difficulty in construction. It is feasible.	Much equipment is required with relatively high difficulty in construction. It is feasible.
	Construction conditions	Satisfied	Not fully satisfied
	Construction period	Short	Relatively long
	Operation and maintenance	Few maintenance at few places	Heavy maintenance workload at many places
	Heat source	Waste heat	Natural gas
Environmental impact	Impact on environmental sensitive sites	Little impact	Great impact
	Soil erosion	Tiny	Little
	New emissions	No exhaust gas will be generated	The gas-fired boilers for heating may increase sulfur dioxide and nitrogen oxide emissions
Social impact	Households and people to be relocated	None	None
	Land occupation (0,000 m^2): permanent and temporary	There is temporary land occupation with small total area	There are temporary and permanent land occupation with relatively large total area
	Arable land occupied (0,000 m^2)	None	None
Cost	Land acquisition cost (CNY/mu)	Low	High
	Environmental costs	Low environment protection investment and low operating cost	Relatively high environment protection investment and relatively high operating cost
	Construction investment	Relatively low	High
Safety and stability of heat supply		Stable and safe	Relatively stable and safe

Conclusion	Option 1 needs no investment in new heat source, which can shorten the construction period and avoid land acquisition, but can guarantee the safety and stability of heat supply. In terms of the technology, environment, cost and social impact, Option 1 is better than Option 2.Therefore, Option 1 is recommended.

3. Xingtai

Three heat source options are selected for comparison for Xingtai Subproject. Please refer to **Figure 8-1** for the relative location of three heat source options. See **Table 8-4** for detailed comparison.

Figure 8-1 Location Diagram for Different Heat Source Options in Xingtai

Table 8-4 Comparison of Alternative Heat Sources for Xingtai Subproject

Alternatives **Comparison contents**		**Option 1**	**Option 2**	**Option 3**
Option contents		Collect industrial waste heat of Zhongmei Xuyang through heat pumps and heat exchangers for district heat supply	Construct new 3,650t/h coal-fired boilers for district heating	Construct new 3,650t/h gas-fired boilers for district heating
Technology	Technical difficulty and feasibility	A few of equipment are required with low difficulty in construction.	Much equipment is required with relatively high difficulty in construction.	Much equipment is required with relatively high difficulty in construction.
	Construction conditions	Satisfied	Satisfied	Satisfied
	Construction period	Short	Relatively long	Relatively long
	Operation and maintenance	Easy for operation and maintenance	Easy for operation and maintenance	Easy for operation and maintenance
	Heat source	Waste heat	Coal	Natural gas
Environmental impact	Impact on environmental sensitive sites	Low	Low	Low
	Soil erosion	The primary station shall be newly constructed on industrial land with little impact on soil	The heat source shall be newly constructed on farm land with great impact on soil	The heat source shall be newly constructed on farm land with great impact on soil
	New emissions	No exhaust gas will be generated	It will consume standard coal for 140,443.5 t/a and emit sulfur dioxide for 356.697 t/a and nitrogen oxide for 412.847 t/a	It will consume natural gas for 110,34 million m3/a and emit sulfur dioxide for 4.039t/a and nitrogen oxide for 206.460t/a
Social impact	Households and people to be relocated	None	None	None
	Land occupation (0,000 m^2): permanent and temporary	No new fuel yard and solid waste yard with the heat exchange	Due to the large area of the boiler room, the project may	Due to the large area of the boiler room, the project may

		system, heat pump and other units occupy small area. The project may cover a total area of about 33,000 m2.	cover a total area of 240,000 m2.	cover a total area of 200,000 m2.
	Arable land occupied (0,000 m^2)	It will occupy the industrial land rather than farm land	It will occupy a arable land for about 210,000m2.	It will occupy a arable land for about 210,000m2.
Cost	Land acquisition cost (CNY/mu)	Low	High	High
	Environmental costs	Low environment protection investment (about CNY110,000) and low operating cost	High environment protection investment (about CNY 18,500,000) and high operating cost	Low environment protection investment (about CNY 80,000) and low operating cost
	Construction investment	CNY 145,600,000	CNY 49,100,000	CNY 69,000,000
Safety and stability of heat supply		Stable and safe	Relatively stable and safe	
Conclusion		Option 1 will use industrial waste heat for centralized heating with high one-time investment in equipment, but it needs less investment in environmental protection, covers small area and is ease for construction without new emissions of sulfur dioxide, nitrogen oxides and other pollutants, creating great environmental benefits. Therefore, Option 1 is better than Option 2 and 3. Thus, Option 1 is recommended herein.		

4. Zhangjiakou

Two heat source options are selected for comparison for Zhangjiakou Subproject. See **Table 8-5** for details.

Table 8-5 Comparison of Alternative Heat Sources for Zhangjiakou Subproject

Alternatives **Comparison contents**		**Option 1**	**Option 2**
Option contents		Take Zhangjiakou Power Plant as the main heat source and transform the existing 2 coal-fired boilers of Dongyuan Heating Co., Ltd. into gas-fired boilers as a supplementary heat source	Transform the existing 4 coal-fired boilers of Dongyuan Heating Co., Ltd. and other decentralized coal-fired boilers into gas-fired boilers and develop other gas-fired boilers as the heat source
Technology	Technical feasibility	Feasible with matured technology	Feasible with matured technology
	Construction conditions	Satisfied	Satisfied
	Construction difficulty	Low	Low
	Construction period	It needs a relatively short construction period to transform 2 boilers	It needs a long construction period to transform 4 boilers and 99 small boilers and to construct new gas-fired boilers
	Operation and maintenance	Easy for operation and maintenance due to centralized heat source	Not easy for operation and maintenance due to decentralized heat sources
	Heat source	Waste heat + natural gas	Natural gas
Environmental impact	Impact on environmental sensitive sites	Due to the short construction period to transform 2 boilers and centralized heat sources, it may impact sensitive sites within a short time and impact the environment within a limited scope.	Due to long construction period and decentralized heat sources, it may impact sensitive sites within a long time and largely impact the environment.
	Soil erosion	The existing site shall be used for transformation with little impact on vegetation and soil.	Due to construction of new boilers, it will occupy new land and cause soil erosion to a certain degree.
	New emissions	The substitution of coal by gas and centralized heat supply may increase energy efficiency and reduce emissions	The coal will be substituted by gas, but it will still adopt decentralized heating with construction of new gas-fired boilers. As a result, the pollutant emission will not be as significant as Option 1.
Social impact	Households and people to be relocated	None	None
	Land occupation (0,000 m^2): permanent and temporary	It may permanently and temporarily occupy a land of 13,700m2 and 135,200m2 respectively.	It may permanently and temporarily occupy a land of 20,550m2 and 202,800m2 respectively.

		Thus, it will cover a relatively small area.	Thus, it will cover a relatively large area.
	Arable land occupied (0,000 m^2)	None	None
Cost	Land acquisition cost (CNY/mu)	Low	Low
	Environmental costs	Relatively low; CNY 695,700	Relatively high; CNY 1,043,600
	Construction investment	Relatively low; CNY 25,766,400	Relatively high; CNY 3,864,960
Safety and stability of heat supply		Safe and stable with matured technology	There is a big gap in gas supply, thus there is a great uncertainty to guarantee the heat safety.
Conclusion		Based on the above analysis, Option 1 is recommended herein	

8.3 Comparison of Pipe Network Layouts and Heat Exchange Substation Locations

Two pipe network layouts are selected for comparison for each of the four subprojects. For location of heat exchange substation, various perspectives are used in alternatives comparison in different subprojects: for Chengde Subproject, ground buildings and basement are compared; the comparison of alternatives for Pingshan focuses on economic and technical aspects of regional heat exchange substation and building-level heat exchange substation; for Xingtai subproject, the comparison focus on the number of heat exchange substations; and for Zhangjiakou subproject, two alternatives for pipeline layout and associated heat exchange substation location are compared.

8.3.1 Chengde

1. Comparison of Heat Exchange Substation Locations

In Chengde Subproject, 114 building-level heat exchange substations will be built. Therefore, two alternatives for site selection are compared, including 1) residential quarter-level heat exchange substations, and 2) building-level (basement) heat exchange substations. Please see **Table 8-6** for comparison details.

Table 8-6 Comparison of Heat Exchange Substation Locations for Chengde Subproject

Alternatives **Comparison contents**		**Option 1**	**Option 2**
Option contents		Directly utilize basement of buildings to construct a few number of building-level heat exchange substations	Construct a few number of residential heat exchange substations through separate heat exchange rooms within residential quarters
Technology	Technical feasibility	Simple and feasible	Simple and feasible
	Construction conditions	Satisfied	Not fully satisfied
	Construction difficulty	A few of equipment are required with low difficulty in construction and light workload	It needs to construct heat exchange rooms and requires much equipment with great difficulty in construction and heavy workload
	Construction period	Short	Relatively long
	Operation and maintenance	Heavy maintenance workload at many places	Maintenance at few locations is needed, but additional housing maintenance is required
Environmental impact	Impact on environmental sensitive sites	Little impact	Great impact
	Soil erosion	Tiny	Little
Social impact	Households and people to be relocated	None	None
	Land occupation (0,000 m^2): permanent and temporary	There will be small area of temporarily land occupation, but no permanent land occupation	There will be small area of temporary land occupation with permanent land occupation
	Farm land occupied (0,000 m^2)	None	None
Cost	Land acquisition cost (CNY/mu)	Very low	Low
	Environmental costs	Low environment protection investment and low	Relatively high environment protection

		operating cost	investment and relatively high operating cost
	Construction investment	High	Low
Heating effect		There is relatively simple heating adjustment and good heating effect	It is difficult to adjust the heat with slightly inferior heating effect
Conclusion		As for Option 1, building-level heat exchange substations are characterized by small area, light workload, low operation and maintenance cost, simple heating adjustment and good heating effect. Its initial investment is higher than Option 2, but its lower operation and maintenance cost will be conducive to the financial feasibility and sustainability in long term. Therefore, Option 1 is more effective and recommended.	

2. Comparison of Pipe Network Layouts

The pipe network layout of Chengde is special, because the main heat supply network has been basically completed in the main urban area with a consideration for the layout and alignment of the future heating network (including the primary and secondary network), which will stretch to various new heating load areas based on the existing main network. That is, the pipe network layout of Chengde Subproject has been determined.

Therefore, the existing pipe network layout should be the most appropriate and feasible and cannot be substituted. If other main heating pipeline and heating network are developed in new heating areas, it will significantly increase the work amount and construction difficulty, but also cause duplication of investment and waste of existing resources. Otherwise, in addition to the planned pipeline, many other areas (road sections) are not appropriate to develop the heating pipe network in such a hilly city as Chengde.

With a consideration to the above circumstance, it is inappropriate to take other pipeline network plan for comparison. Therefore, the heating pipeline network plan for the completed main heating pipeline is recommended for the subproject.

8.3.2 Pingshan

1. Comparison of Heat Exchange Substation Locations

Two alternatives of regional heat exchange substation and building-level heat exchange substation are selected for Pingshan Subproject and compared from technical and economical perspective. See **Table 8-7** for details.

Table 8-7 Comparison of Heat Exchange Substation Locations for Pingshan Subproject

Alternatives **Comparison contents**		**Option 1**	**Option 2**
Option contents		Construct regional heat exchange substation	Contract regional heat exchange substation and building-level heat exchange substation at the same time
Technology	Technical feasibility	Simple and feasible	Simple and feasible
	Construction conditions	There is high building density and short distance between buildings	There is low building density and far distance between buildings
	Construction difficulty	A few of equipment are required with low difficulty in construction and light workload	It needs to construct heat exchange rooms and requires much equipment with great difficulty in construction and heavy workload
	Construction period	Short	Relatively long
	Operation and maintenance	Light maintenance workload at few places	Heavy maintenance workload at many places
Environmental impact	Impact on environmental sensitive sites	Great impact	Great impact
	Soil erosion	Little	Little
Social impact	Households and people to be relocated	None	None
	Land occupation (0,000 m^2):	There will be large area of permanent land	There will be small area of permanent and

	permanent and temporary	occupation, but small area of temporary land occupation.	temporary land occupation.
	Farm land occupied (0,000 m^2)	None	None
Cost	Land acquisition cost (CNY/mu)	Low	Low
	Environmental costs	Low environment protection investment and low operating cost	Relatively high environment protection investment and relatively high operating cost
	Construction investment	With a consideration to the engineering investment of about CNY 618,900, pipe network investment of about CNY 395,000 and investment of about CNY 37,500 in installation of thermal meters, the total investment will be CNY 1,051,400.	With a consideration to the engineering investment of about CNY 884,000, primary pipe network investment of about CNY 173,000, secondary pipe network investment of about CNY 248,000 and investment of about CNY 12,500 in installation of thermal meters, the total investment will be CNY 1,317,500.
Heating effect		Good	Good
Conclusion		Giving the high density and high storey of buildings and short distance between buildings in urban area of Pingshan, Option 1 is recommended. Some multi-storey buildings suitable for building-level heat exchange substation at the downtown, such as Chenghuayuan (6-storey building). It can be developed as a pilot for building-level heat exchange substation.	

2. Comparison of Pipe Network Layouts

Two pipe network layouts for Pingshan Subproject are prepared for comparison. See **Table 8-8** for details.

Table 8-8 Comparison of Pipeline Network Layout Plans for Pingshan Subproject

Alternatives **Comparison contents**		**Option 1**	**Option 2**
Option contents		It is necessary to construct the primary pipeline network for 5,740m, in which, the four major network alignments include: 1) from Wenhua Street to West Bopo Road in north (at a diameter of DN500), 2) from West Bopo Road to North Street in west (at a diameter of DN500), 3) from the Golden Triangle of North Street to until the Outer Ring Road in north (at a diameter of DN400), and 4) from Zhonghua Street to Kaizhi High School in north (at a diameter of DN400)	It is necessary to construct the primary pipeline network for 4,011m, in which, the four major network alignment include: 1) from the exit of the power plant to the State Road in southeast (at a diameter of DN500) and across the road to Feicheng International Community (at a diameter of DN250), 2) from the west of the older Ye River Bridge to West Bopo Road in north (at a diameter of DN500) and to Jianshe Street (at a diameter of DN500), 3) from Kangning Garden on West Zhongshan Road to Gangcheng Road Intersection in west (at a diameter of DN500) and to West Bopo Road (at a diameter of DN400), 4) from Dongchuan Street to Huaying Road in north (at a diameter of DN300).
Technology	Technical feasibility	Simple and feasible	Simple and feasible
	Construction conditions	Satisfied	Satisfied
	Construction difficulty	High construction difficulty due to resettlement and land acquisition	Low
	Construction period	Relatively long	Short
	Operation and maintenance	Low	Low
Environmental impact	Impact on environmental sensitive sites	Great impact	Relatively low
	Soil erosion	Little	Little
Social impact	Households and people to be relocated	Yes	Yes
	Land occupation (0,000 m^2):	There will be large area of permanent land	There will be large area of permanent land

	permanent and temporary	occupation, but small area of temporary land occupation.	occupation, but small area of temporary land occupation.
	Farm land occupied (0,000 m^2)	None	None
Cost	Land acquisition cost (CNY/mu)	Low	Low
	Environmental costs	Low	Low
	Construction investment	High	High
Heating effect		Good	Good
Conclusion		According to the comparison result, giving the land acquisition for the North Street North Extension Project and Zhonghua Street North Road Extension Project have not been completed in Option 1, the heat pipe network for this section an not be carried out simultaneously with the Subproject; with respect to Option 2, the land acquisition and resettlement for the section from Kangning Garden to Gangcheng Road are being carried out, the Subproject can be constructed together with the road engineering to realize simultaneous design, construction and inspection, so as to ensure the implementation of the project and avoid land acquisition for pipe network at both sides of the road. Therefore, Option 2 is recommended.	

8.3.3 Xingtai

1. Comparison of Heat Exchange Substation Locations

Two alternatives with different conventional heat exchange substations for Xingtai Subproject are compared for site selection. Option 1 proposes to construct 128 conventional and 14 building-level heat exchange substations. And Option 2 proposes to construct 134 conventional and 14 building-level heat exchange substations. See **Table 8-9** for details.

Table 8-9 Comparison of Heat Exchange Substation Locations for Xingtai Subproject

Alternatives **Comparison contents**		**Option 1**	**Option 2**
Option contents		One substation at the Xingtai Radio and Television Center for the Xingtai Center of Disease Control and Xingtai Radio and Television Center; one at Urban Management Bureau for the Eye Hospital and Urban Management Bureau; one at Community Health Center for the 5th Traffic Police Brigade and Community Health Center; one at State Administration of Taxation for the Human Resources and Social Security Bureau, State Administration of Taxation, and Xingtai General Traffic Police Brigade; and one at Xingtai Tobacco Company for the Xingtai Tobacco Company and Quanbeiquan No.19 Building.	It proposes to construct 11 substations in total respectively in the Xingtai Center of Disease Control, Xingtai Radio and Television Center, Eye Hospital, Urban Management Bureau, 5th Traffic Police Brigade, Community Health Center, Human Resources and Social Security Bureau, State Administration of Taxation, Xingtai General Traffic Police Brigade, Xingtai Tobacco Company and Quanbeiquan No.19 Building.
Technology	Technical feasibility	Simple and feasible	Simple and feasible
	Construction conditions	Satisfied	Satisfied
	Construction difficulty	A few of equipment are required with low difficulty in construction.	Much equipment is required with relatively high difficulty in construction.
	Construction period	Short	Relatively long
	Operation and maintenance	Light maintenance workload at few places. A conventional heat exchange substation shall be shared by 2-3 residential quarters, resulting in low thermal efficiency and poor operating stability.	Heavy maintenance workload at many places. A residential quarter shall equip with a separate conventional heat exchange substation with high thermal efficiency and stable operation.
Environmental impact	Impact on environmental sensitive sites	There will be significant impact within a limited scope.	There will be significant impact within large scope.
	Soil erosion	Little	Little

Social impact	Households and people to be relocated	None	None
	Land occupation (0,000 m^2): permanent and temporary	There will be small area of permanent and temporary land occupation.	There will be large area of permanent land occupation, but small area temporary land occupation.
	Farm land occupied (0,000 m^2)	None	None
onCost	Land acquisition cost (CNY/mu)	Low	High
	Environmental costs	Low environment protection investment and low operating cost	Relatively high environment protection investment and relatively high operating cost
	Construction investment	Low, CNY 118,600,000	Low, CNY 124,400,000
Heating effect		Good	Good
Conclusion		Compared with Option 2, Option 1 has relatively poor operation stability, but has less land occupation, less investment cost, lower construction difficulty, and less impact on the environment. Therefore, Option 1 is recommended.	

2. Comparison of Pipe Network Layouts

Two pipe network layouts for Xingtai Subproject are prepared for comparison. Please refer to **Figure 8-2** for the relative location of two pipeline network layout plans.

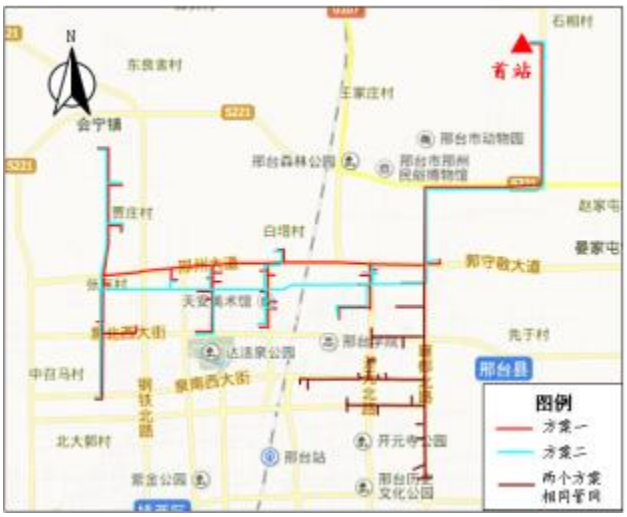


Figure 8-2 Schematic Diagram for Xingtai Pipeline Network Locations

Option 1: DN1200 main pipeline will be installed from the primary substation to Xuyang Avenue in east, to S221 in south, to Xiangdu Road in west along Provincial Road S221 and then to Xingzhou Avenue in south along Xiangdu Road. And then, two branch pipelines shall be installed from here: one DN900 pipeline led from the intersection of Xiangdu Road and Xingzhou Avenue to Taihang Road in west along Xingzhou Avenue, and the other DN700 pipeline from the intersection of Xiangdu Road and Xingzhou Avenue to Dongguan Street in south along Xiangdu Road.

Option 2: DN1200 main pipeline will be installed from the primary station to Xuyang Avenue in east, to S221 in south, to Xiangdu Road in west along the Provincial Road S221 and to Renmin Avenue in south along Xiangdu Road. And then, two branch pipelines shall be introduced from here: one DN900 pipeline from the intersection of Xiangdu Road and Renmin Avenue to Taihang Road in west along Renmin Avenue, and the other DN700 pipeline from the intersection of Xiangdu Road and Renmin Avenue to Dongguan Street in south along Xiangdu Road.

See **Table 8-10** for comparison of two pipeline network layout plans.

Table 8-10 Comparison of Pipeline Network Layout Plans (Alignment) for Pingshan Subproject

Alternatives / Comparison contents		Option 1	Option 2
Technology Technology	Technical feasibility	Technically feasible	Technically feasible
	Construction conditions	Excellent	Excellent
	Construction difficulty	There are 15 crossing projects and short length of pipelines	There are 15 crossing projects and long length of pipelines
	Construction period	Short	Relatively long
	Operation and maintenance	Easy	Easy
Length of pipeline to be constructed	Overall length (km)	52.186	54.243
	Length of major pipeline (km)	28.496	29.175
	Length of branch pipeline (km)	23.690	25.068
Environmental impact	Impact on environmental sensitive sites	As the relatively short length of pipeline passes through the urban area, there are less environmental sensitive sites along the route.	As the relatively long length of pipeline passes through the urban area, there are more environmental sensitive sites along the route.
	Soil erosion	Short length of pipeline, short construction period, few damages to vegetation and soil with low post-revegetation investment.	Long length of pipeline, long construction period, great damages to vegetation and soil with high post-revegetation investment.
Social impact	Households and people to be relocated	None	None
	Land occupation (0,000 m^2): permanent and temporary	There will be small area of permanent land occupation and the area of temporary land occupation will be 87,500m2.	There will be small area of permanent land occupation and the area of temporary land occupation will be 90,900m2.
	Farm land occupied (0,000 m^2)	None	None
Cost	Land acquisition cost (CNY/mu)	Low	Low
	Environmental costs	Low	Low
	Construction investment	CNY 725,000,000	CNY 753,000,000
Conclusion		From the point of view of the investment economy, the reduction of the length of pipe network makes the investment in Option 1 less than Option 2; from the environmental and social impact, Option 1 is characterized by short pipeline, less temporary land acquisition, small area of effect, short construction period, less soil erosion and fast ecological recovery. Therefore, Option 1 is better than Option 2.And, Option 1 is recommended herein.	

4) Zhangjiakou

For Zhangjiakou Subproject, the location of the pressure isolation heat exchange station determines the alignment of main and branch pipeline. Therefore, the selection of site for heat transfer substation and pipeline alignment shall be designed together. To this end, two different options are compared.

Option One: It is proposed to construct a new pressure isolation heat exchange station in the original sulfuric acid plant. A new DN900 zero-level pipe network will be built, which shall connect to hot water pipe from the power plant at Erwei Road, stretch along the Shengli Road to north for about 2.4km and enter into the pressure isolation heat exchange station. After heat exchange, a DN900 first-level hot pipe will be installed from the north wall and led to South Hongqilou Street in north and will divide into two branches: a DN700 heating pipeline shall be laid and serve for end users along the Shengli Middle Road and Shengli North Road to Wuyi Avenue in north, and connect to the existing DN450 hot water pipeline network at Dongan Avenue; And a DN600 hot water pipeline network shall be laid along Jianguo Road in north and

connect to the existing DN600 pipe network. The total length of hot pipe network to be constructed is about 19km.

Option Two: It is proposed to construct a new pressure isolation heat exchange station in Liantong Boiler Room. After connection to the hot water pipe from the power plant at Erwei Road, a new DN900 zero-level pipe network shall be laid along Shengli Middle Road to East Jianshe Street in north and divide into two branches: a DN700 zero-level heating network shall be laid along Shengli North Road to Wuyi Avenue in north and serve for end users directly served by the power plant (low-pressure area). The other DN800 zero-level hot water pipeline shall stretch along East Jianshe Street for about 800m and enter into the pressure isolating heat exchange station in Union plot. After heat exchange, a DN800 hot water pipeline shall be installed to connect with the existing DN700 pipeline network and supply heat along Yangjiafen Road in north for end users (high-pressure area). The total length of hot water pipeline network to be constructed is about 20.5km.See **Table 8-11** for details.

Table 8-11 Comparison of Heat Exchange Substation Locations and Pipeline Network Layout Plans

Category / Comparison items		Option 1	Option 2
Technology	Technical feasibility	It is technically feasible to construct pressure isolating heat exchange station and construct pipeline network.	It is technically feasible to transform the original boiler room, construct pressure isolating heat exchange station and construct pipeline network.
	Construction conditions	Satisfied	Satisfied
	Construction difficulty	There is a risk of heavy metal soil contamination at the pressure isolation heat exchange station and soil must be recovered before construction. There is also no difficulty in pipeline construction.	It needs not to recover the soil, but can directly construct the pressure isolation heat exchange station. There is also no difficulty in pipeline construction.
	Construction period	Relatively long	Short
	Operation and maintenance	Easy	Easy
Environmental impact	Impact on environmental sensitive sites	Great. Especially, the impact will be enlarged with increase in the construction period of pressure isolating heat exchange station.	Great. It has special impact on surrounding hospitals.
	Soil erosion	The full soil recovery required by the construction of pressure isolating heat exchange station will have great soil erosion.	There is short construction period and little soil erosion.
Social impact	Households and people to be relocated	None	None
	Land occupation (0,000 m^2): permanent and temporary	There will be a small area of permanent land occupation of 5mu.	There will be a small area of permanent land occupation of2.84mu.
	Farm land occupied (0,000 m^2)	None	None
Cost	Land acquisition cost	Relatively high, 1,500,000	Relatively low, 852,000
	Investment in environment protection	High	Low
	Construction investment	Relatively high, 195,181,700	Relatively low, 187,441,000
Conclusion		For Option 1, there is a risk of heavy metal soil contamination at the site of new pressure isolation heat exchange station and it needs soil recovery before construction. So, it may increase the difficulty in construction, extend the construction period and increase costs. Therefore, Option 2 is recommended.	

8.4 Comparison of Pipe Materials

Two alternatives of pipe materials are selected for comparison for each of Chengde, Pingshan, Xingtai and Zhangjiakou Subproject. See **Table 8-12** for details.

Table 8-12 Comparison of Subprojects

Alternatives / Comparison items		Option 1	Option 2	Merits
Option contents		It proposes to use polyurethane foam prefabricated insulated pipe with high-density polyethylene outer jacket: steel pipe will be adopted for heat supply pipe, with rigid polyurethane foam for insulation and high-density polyethylene for protective housing.	It proposes to use steel pipe for heat supply pipe, with rock wool for insulation and glass wool cloth for protective housing.	Option 1 is better
Technology	Technical difficulty and feasibility	It is suitable for direct burying with better anti-corrosion and insulation performance than Option 2, as well as good insulation effect.	It is suitable for pipe trench, but is vulnerable to water with poor anti-corrosion, insulation performance and high heat loss.	Option 1 is better
	Construction conditions	Suitable for direct burying	Suitable for pipe trench burying	Option 1 is better
	Construction difficulty	Low	Low	Equivalent
	Construction period	Relatively short	Relatively long	Option 1 is better
	Operation and maintenance	Little maintenance	Great maintenance	Option 1 is better
Cost	Construction investment	There is high pipe cost and low civil work cost.	There is low pipe cost, but high construction cost due to pipe trenches.	Option 1 is better
	Operating costs	Low	High	Option 1 is better

As for Option 1, the polyurethane foam prefabricated insulated pipe with high-density polyethylene outer jacket is suitable for direct burying with short construction period, low operating cost and better anti-corrosion and insulation performance than Option 2. Therefore, Option 1 is better. Option 1 is recommended for the four subprojects.

9. Environmental Risk Analysis and Mitigation Measures

9.1 Environmental Risk Identification

1. Risk Identification at Design Stage

The possible risks of this Project have been analyzed in the design stage of this Project, including fire, explosion, noise hazard, vehicle injury, object hit, lifting injury, collapse, high fall, scald and electric shock, etc. The occurrence of the above risks may be caused due to improper design, such as unreasonable general layout, design defects of buildings (structures), heat supply pipelines and power supply and distribution system, and lack of design of countermeasures for natural disasters.

The risk problems of heat source renovation of Xingtai Subproject which is associated with this Project have been determined in the design stage of this Project. Both the main heat source and standby heat source of Xingtai Subproject are chemical enterprises. In accordance with "Interim Provisions on Supervision and Administration of Major Hazard Source of Hazardous Chemicals" and "Hebei Province Methods for Classification of Major Hazardous Sources ", storage area, phase III coking production area, and gas pipelines of Hebei RISUN Coking Co., Ltd. are classified as Class 3, Class 4 major hazardous sources and major hazard source, and gas-fired boilers of Xingtai RISUN Chemical Co. are classified as Class 3 major hazard source. Prevention and monitoring methods for those possible risks have been developed in Xingtai Subproject. The heat source enterprises will follow these requirements and implement the monitoring measures.

2. Risk Identification at Construction Stage

During the construction of this Project, the improper operation and use of electrical equipment and cable, etc. may result in electrical fire accident; pressure vessels containing oxygen and acetylene, etc. used during the welding are easy to cause explosion; the transport vehicles may cause injuries to pedestrians; cross-operation and running of construction machinery, etc. during the construction may occur with object hit and mechanical injury, etc.; lifting accident and mechanical injury, etc. may happen during the installation of important equipment and mechanical installation. All will cause production safety accidents.

During the construction of heat supply pipelines, pipeline derusting, decontamination, anticorrosion and on-site patch, etc. are not conducted according to the construction requirements; the on-site coating operation is not strictly managed, resulting in poor bonding of the anticorrosive coating and pipe body; the pipe is roughly lowered in and the backfilling operation is hasty, resulting in mud and rock to impact and damage the anticorrosive coating, and metal pipe wall to directly contact with soil to cause chemical corrosion and electrochemical corrosion, leading to perforation and leakage of metal pipe wall. Another important pipe damage accident risk is the construction deficiencies of pipeline butt weld quality, such as arc burning through, pore, slag inclusion and lack of penetration. In addition, pipe handling is not operated according to the codes, resulting in fatigue crack of the pipe. The pipe defects due to the above improper operations will be possible to cause pipelines to leak or burst in the future operation stage, thus causing casualties and property loss.

The mismanagement of the acetylene used in pipeline gas welding may cause explosion to threat life safety of people.

Any improper operation in the laying of heat supply pipelines of this Project may lead to the risk of interfering with and influencing other municipal pipelines, such as water supply and drainage pipeline, communication line and civil gas pipeline, thus resulting in temporary damage of corresponding line or possibility of suspension of utility functions of partial area. All the above circumstances are possible to cause pipeline safety accidents in the construction stage.

3. Risk Identification in Operation Stage

The pipe network will transmit high temperature water in the operation stage, which has relatively high energy and can cause scald and suffocation accidents, or possibly even death in severe case. The leakage of the heat supply network due to damage and corrosion of anticorrosive coating will affect the normal heat supply, especially for the service pipes which will directly threaten safety of residents if there is a leakage due to corrosion. Gases in the heat supply pipelines may also explode. The nitrogen purging during the leakage maintenance of pipelines and valves, etc. will cause poisoning and suffocation.

During operatoin, the pressure isolation heat exchange station and heat station, etc. will use electrical equipment. There is possible electric shock and electrical injury during such use, causing the occurrence of risks such as casualties and electrical fire.

The two gas-fired boilers in Zhangjiakou Subproject will be renovated and will use natural gas as fuel. Natural gas is flammable gas under Category 2.1 as specified in "Classification and Labeling of Hazardous Chemicals "(GB13690-92), of which the main component methane is flammable, can form explosive mixture when mixing with the air, and lead to combustion explosion when there is open fire and high energy heat; can occur with violent chemical reaction with fluorine and chlorine, etc.; if methane is in high temperature, the vessel internal pressure will increase and have dangers of cracking and explosion. Too high concentration of methane in the air will suffocate people. When methane in the air reaches 25%-30%, it will lead to headache, dizziness, feebleness, inattention, accelerated respiration and heartbeat, and fine motor disorder, etc., and even suffocation and coma, etc. due to hypoxia.

In addition, induced by non-artificial earthquake and flood, etc., environmental risk source will also cause environmental pollution or ecological damage, etc. to the area.

4. Maximum Credible Accident

According to *Technical Guidelines for Environmental Risk Assessment on Projects* (HJ/T169-2004): The maximum credible accident refers to the major accident most seriously harming the environment (or health) among all accidents with a predicted probability of not zero.

It is analyzed and determined that: The maximum credible accident during the construction of this Project is mainly the possible pipeline damage and electric shock risk during the pipe network construction.

It is analyzed and determined that: The most possible accident during the operation is the possible leakage (steam and gas), electric shock and various injuries, etc. due to various reasons, wherein, the leakage may cause the danger of explosion of which the consequence is serious.

9.2 Environmental Risk and Consequence Analysis

9.2.1 Analysis of Main Risks in Design Stage

In project design stage, the unreasonable general layout design, design defects of structures, heat supply pipelines and power supply and distribution system, and lack of design of countermeasures for natural disasters, etc. will cause accidents and risks, thus affecting the subsequent construction and operation. Furthermore, as the area involved by the heat power supply is relatively wide, including heat sources, heat supply pipelines, and heat exchange stations, etc., the general layout of only those heat sources relatively centralized is analyzed for this Project. See Table **9-1** for the specific content.

Table 9–1 List of Environmental Impact Risk Analysis at Project Design Stage

No.	Risk Category	Risk Content Analysis
1	General Layout	(2) If the classification of fire hazards in production, fire resistance rating and number of floors, floor space, fire separation distance and safe evacuation, etc. of boiler plant and auxiliary production plant are not reasonably designed, it will cause fire and explosion accidents under certain conditions, or magnifying the accidentsA plenty of mechanical and electrical equipment used in the production will generate certain noise during running, and if sound insulation is not considered for the designed doors and windows and maintenance structures of the building, the work environment will suffer from the noise; (3) If lightning protection and grounding facilities are not set for the buildings and structures, fire and explosion will easily occur due to lightning and spark, etc. (4) Though safety entrance and exit are set in the plant, there will be danger of vehicle injury if the management is poor and no safety boundary and safety warning signs are set when the transport volume is large; (5) If there is no sufficient maintenance site or the site is narrow for the equipment and pipeline layout, there will be possible dangers such as object hit and lifting injury during the maintenance; (6) If there is any defect of the firefighting access setting in the plant and such access is blocked, it may delay the timing of extinguishment and result in accident spread once there is fire; (7) It may result in vehicle injury and fire danger if the plant road is not smooth, the movement of people and goods is mixed, the turning radius is insufficient and the fire road is blocked.
2	Buildings and Structures	(1) If the design and construction units of buildings and structures are not qualified, there may be design and construction defects, resulting in building fracture and collapse accidents; (2) If geological condition, structural load of upper parts of buildings and structures, and seismic grade requirement are not fully considered during foundation treatment and foundation type selection of buildings and structures, it may cause foundation settlement and house collapse, etc. Poor foundation treatment of buildings and structures may cause collapse of buildings; (3) The unreasonable design or non-compliance with code requirements of building floor, ground, wall, stairs, door and window, etc. may lead to crack of floor and ground, external corrosion of wall, and collapse, etc. (4) It may cause high fall if the platform and equipment opening and hole are not set with protecting tube, handrail or cover plate, and various ladders and platforms are improperly designed, used with improper materials or not firmly welded, or severely corroded during the use, or for long years out of repair; (5) As buildings differ in use functions and bearing capacity requirements, if the selection of house structural form is unreasonable and the design strength cannot meet exogenic action requirement, it will cause crack and collapse dangers; (6) The earthquake fortification intensity of the place is 7, and if there is a large earthquake, it will possibly result in equipment toppling and workshop collapse accidents; (7) As the winter temperature is relatively low, if the insulation of equipment and facilities is damaged or the insulation effect is poor, it may cause frost damage to equipment and facilities due to low temperature, and cause leakage of hot water, resulting in personnel scald accident; (8) Imperfection of lightning arresters of buildings (structures) or ground resistance exceeding standard is easy to cause lightning damage; (9) It may cause misoperation of employees and indirectly cause production accident if lighting of architectural structure is not considered and the workplace lighting is poor;
3	Heat Supply Pipelines	a) The design of the heat supply pipeline system is the first and the very important step to ensure the engineering safety, and the design quality directly affects the engineering quality. And there are subjective and objective factors affecting the design quality b) There is very close relationship between the operation safety of long-distance pipelines and the overall flow of the system, and between process procedure of each heat exchange station and system equipment layout. The system operation will be stable with high safety reliability if the process procedure is reasonably set, the equipment layout is appropriate, and the requirements of transmission operation condition can be met. Otherwise, it will cause very serious hidden dangers to the safe operation of the system or even make the system unable to operate. c) During hydraulic and thermal process calculation, etc. to determine the transmission friction and temperature loss (situation of heated transmission to be considered), it will cause improper location selection of stations (sites) once the design parameters or process conditions are not reasonably determined, thus causing various potential safety hazards to the system. d) Strength design coefficient of pipelines will be determined according to the classification of area passed by the pipelines or grade and size of road and river, etc. crossed by the pipelines. If the area along the pipeline is not clearly investigated, it will possibly occur with incorrect classification resulting in high class to be

		determined as low class, large gully to be determined as small gully, and large and medium-sized rivers to be determined as ordinary rivers, etc., eventually leading to inappropriate selection of design coefficient, failure of pipeline wall thickness calculation to meet the on-site actual situation, and errors in analyzing pipeline stress and checking strength, rigidity and stability, to cause pipeline deformation, bending and even fracture. e) Pipelines and heat exchange stations are positioned on bad geological sections with earth fall, fault, landslide, swamp, quicksand, debris flow or high seismic intensity, etc., will result in pipeline bending, twisting, arching and even fracture, and damage to equipment and facilities; when their safe fire protection distance with the surrounding buildings (structures) does not meet the standard requirement, they will be easily affected and suffer from potential safety hazards; if buildings (structures) in the heat exchange station are in unreasonably layout and unreasonable areas, the fire separation distance is insufficient, the fireproofing and explosive-proof grades fail to meet the requirements, and there are no fire control facilities and the fire protection procedure is unreasonable, they will easily impact each other and cause accidents, thus affecting the adjacent facilities. f) Compatibility of materials and media is not fully considered when materials of pipe, fitting, flange, valve, mechanical equipment, and instrument and meter are being determined, causing corrosion when use; vibration failure is not fully considered for the flange, gasket and screw combinations connecting the transmitting heat exchange station and driving machinery, causing screw fracture and gasket damage leading to leakage; parameters of safety accessories such as pressure gauge, thermometer and safety valve are not reasonably designed, resulting in potential safety hazards and distortion of data of the control system. g) Effect of the stray current caused by soil resistivity, buildings (structures) near the pipelines and electrical equipment is not fully considered, causing aging, insufficient and even invalid anticorrosion of the pipeline anticorrosive coating. Unreasonable selection of anticorrosive materials for inner and outer surfaces of pipelines, incorrect pipeline construction method, pipeline thickness failing to meet the requirements of use conditions, too far distance and unreasonable protection parameter setting of cathodic protection stations of pipelines, or inappropriate material selection for sacrificial anode, results in insufficient protective capability. h) If the plane layout of pipelines in the heat exchange station area is unreasonable, it will lead to deformation damage or vibration of pipelines due to heat-expansion and cold-contraction; if pipeline is not installed with oil return valve, it will result in pipeline pressure build-up. Elbow setting, elastic laying, effect of geology for burying and temperature difference change, etc. of the buried pipelines have a significant influence on the displacement of the pipelines in operation, and if such are not fully considered during the flexibility analysis, it will cause pipeline bending, arching and even fracture. The vibration analysis also does not fully consider the pipeline displacement caused by the pipeline vibration due to unsteady flow of media in pipelines or ground vibration at positions where pipelines cross road and railway. i) Regular inspection or decontamination cannot be conducted because the regular inspection or pipe cleaning requirement is not fully considered for the pipeline structure resulting in passing of the pipeline internal inspection system or spherical pig to be unable to be guaranteed after pipelines are put into use; or structural design of pipeline and pressure equipment is so unreasonable that the process operation requirements are hard to be met or even major safety accidents are caused. j) The lightning and static electricity protection does not take into full account the natural conditions of area passed by pipelines and actual situation of project operation, or the relevant design structures and installation positions, etc. do not meet requirements of regulations and standards.
4	Natural Conditions	(1) Earthquake Earthquake disaster happens suddenly and unpredictably, and can cause severe damage and great influences on the society. There is no new active fault in the proposed plant site and surroundings, the seismic activity in the area of the engineering site is relatively weak; the active degree of the historical and present earthquakes is relatively low; and the proposed site is a stable site in the area which is suitable for engineering construction. (2) Lightning stroke The pressure isolation heat exchange station, heat station and heat supply network of this Project are possible to be hit and damaged by lightning. The direct lightning will seriously damage the buildings (structures) and equipment and facilities if the lighting protection design is unreasonable; the construction is not standardized; and the grounding resistance value does not meet the code requirement. Once there is lightning stroke, it may cause electrical fire and electric shock, etc. (3) Rainstorm and flood The rainfall of the area frequently occurs in summer every year in a relatively large quantity; if rainfall is not promptly drained, foundation settlement, and equipment tilting and damage may be caused to the production equipment, facilities and buildings due to impeded drainage, thus causing accidents. (4) Snowstorm Snow cover may cause building collapse, affect safety production, and result in casualties or equipment damage.

		(5) Low temperature Low temperature in winter may lead to equipment and pipeline fracture; water freezing easily results in slip and injury from fall, etc. of personnel.

9.2.2 Analysis of Main Risks at Construction Stage

Detailed analysis has been conducted for the reasons of possible risks in the construction stage according to the identified risk factors, as shown in **Table 9-2**.

Table 9–2 Table of Analysis of Risks in Construction Stage

Risk	Reason
Electric Shock	Electricity has quite large harm: electric shock and electrical injury causing casualties and electrical fire, etc. frequently happens. The main harm of electricity to human body includes strong muscle contracture accompanied by immediate loss of consciousness, resulting in sudden cardiac arrest and stop of respiratory movement, burn and disability. Therefore, electricity is the most important hazardous and harmful factor in the construction and operation stages.
Pipeline Break and Leakage	(1) Welding will cause various defects to the long-distance pipelines, commonly including crack, slag inclusion, incomplete penetration, incomplete fusion, overlap, pore and undercut. Generally long-distance pipelines are buried for laying, and continuously operate once completed construction and put into production, therefore if there is any welding defect in the pipelines, such will be hard to be found and not easily repaired, and will cause leakage of pipeline hot water; (2) Construction deficiencies are caused due to construction not following the technical requirements, including low equipment installation quality, defects of pipeline welding such as lack of penetration, slag inclusion, pore, incomplete fusion and patch and flaw joint quality, and quality of crossing engineering, etc.; improper selection of materials of anticorrosive coating, and uneven and incomplete coating; materials not used according to design or incorrectly used; temporary selection of accessories such as valves and sealing elements; proportions, parts and judgment criteria of nondestructive testing do not meet relevant standards; damage to coating or even pipeline during lowering in and backfilling leading to hot water leakage. (3) Material imperfections include material defect and equipment defect. A substantial part in material defects are formed during the manufacturing, manifesting as: poor manufacturing quality, original defect of pipes, and rough processing and poor sealing performance of materials and surfaces, which roots in whether the manufacturing enterprises can effectively control the quality and conduct outgoing control. The equipment defects include own defects of equipment and also mismatching of equipment selection and actual demand, such as matching of valve and pipe, and connection of valve and equipment, which is also an important factor affecting the pipeline safety. (4) Pipelines are required to cross roads and be used with the pipe jacking scheme. If pipelines are poorly constructed, it may affect the normal road operation and even cause collapse of road subgrade, resulting in break of heat supply pipelines. (5) Thrust of pipeline fixation support does not meet the requirement, resulting in pipeline deformation or failure to effectively prevent displacement to lead to the break of pipelines; the foundation of overhead pipeline support is insecure, resulting in deformation or uplift force decrease of support to lead to the deformation and break of pipelines; (6) Pipe network excavation results in possibilities of interfering with other municipal utility pipe networks, such as damage to gas pipeline and gas leakage, causing deflagration and explosion, and temporary damage of corresponding pipe networks leading to suspension of utility functions of partial area, etc.
Acetylene Gas Explosion	If the acetylene gas used in gas welding is not operated and managed as required, such gas will be quite easy to burn and will explode once the burning is fierce, which will cause great damage to surrounding properties and personnel.
Mechanical Injury	Mechanical injuries are possible to happen when during operation and maintenance of various mechanical equipment. The rotating part is not installed with protective cover or such cover is damaged. There are no safety protection devices such as protective cover locking device, on-site emergency shutdown switch, and safety interlocking device. The rotating parts are exposed. The safety protection devices are not maintained properly and the production personnel operate in violation of rules. If there is no traffic management on the construction site, traffic accidents will happen and vehicles injuring people will easily occur.
Safety Management Defect	(1) Safety accidents will possibly happen if there is no required safety production management organization or full-time safety production management personnel, the safety production responsibility system is not implemented, or the safety management system is not perfect; (2) Safety accidents will be easily caused if the safety technical regulations or post operation procedures are not perfect; (3) If the safety management personnel lack the necessary professional safety knowledge, the safety production rules and regulations are not effectively implemented, or there is behavior of instructing in violation of rules, it will easily cause safety accidents; (4) Unsafe acts such as operation and instructing in violation of rules will easily happen if the safety education and training

	are neglected, and safety consciousness and practical operating skills of employees are not improved; (5) When the safety investment cannot be guaranteed, safety facilities will be inadequate, and accident emergency plans are not formulated, accidents will easily happen; (6) It will easily cause repeated accidents if the identification of hidden danger is not organized, and investigation and analysis are not carefully organized after occurrence of unsafe incident.

9.2.3 Main Risk Analysis of Operation Stage

Based on content of this project and risks identified, detailed analysis of the risks during operation stage has been summarized in the Table 9-3.

Table 9-3 Risks Analysis of Environmental Impacts during Operation Stage

Type	Risk	Analysis
Natural gas transmission system	Poisoning and suffocation	(1) If leakage of nature gas pipe happens and density of nature gas reaches a certain degree, poisoning and suffocation of staff may occur. (2) In the sections of natural gas transmission where leakage of toxic easily happens, personnel without wearing protective equipment may get poisoning and suffocation by the leaked toxic. (3) Poor ventilation near the leakage point and failed removal of poisoning gas in a timely manner will lead to poisoning and suffocation of stuff.
	Fire disaster	(1) The fire source near nature gas equipment will ignite the leaked nature gas, which will cause fire disaster. (2) The spark of electric equipment which is set above the nature gas equipment will ignite the leaked nature gas of electric equipment, which will cause fire disaster. (3) (3) Friction spark during using of ironware will ignite the nature gas, which may lead to fire disaster. (4) (4) Any fire source or naked hyperthermal steam pipe will ignite the leaked gas of equipment nearby, which may cause fire accident. (5) (5) Lighting a fire on or near productive nature gas equipment without license and safety measures, will cause fire disaster. (6) (6) Lighting a fire without taking measures on the nature gas shut down will cause fire accident. (7) (7) Grounding failure of nature gas equipment, lightning strike and stray current may lead to fire disaster.
	Explosion	(1) Before clearing the remaining gas inside the nature gas equipment shut down, ignition will lead to explosion. (2) If the remaining nature gas inside the nature gas equipment is not treated for a long time, any exposing to open fire or high temperature over ignition point can lead to explosion. (3) If there is no reliable separation between productive and nonproductive equipment, nature gas will leak into nonproductive equipment. Once encountering open fire or high temperature, explosion will happen. (4) During nature gas on/off operation, risky ignition with going though detecting analysis or explosion test will cause explosion. (5) Any improper handing or delayed handling after power failure will make nature gas enter into air pipe, which will lead to explosion once backfiring.
	Fall accident from high place	Fall accident from high place may happen during inspection and maintenance if the transportation pipe of nature gas is 2m higher than the working base level.
Boiler equipment and system	Boiler furnace explosion	(1) Ignition of boiler against rules will cause explosion. During gas supply and ignition operation of boiler, it should be ignited before gas supply. Any operation against this order will lead to explosion. (2) Before gas supply and ignition operation of boiler, if valve is lax or opened, nature gas will leak into hearth, and then form mixed gas which will lead to explosion once ignition. (3) The moment first ignition is failed, the second stats, which will ignite the remaining flammable gas in hearth and cause explosion. (4) During furnace shutting down, if fuel valve is lax or opened, nature gas will leak into hearth, which will lead to explosion once ignition. (5) One or more burners shut down or in poor combustion, or poor combustion of the starting of some burner, certain density flammable gas will be gathered in the hearth, which will lead to explosion. (6) A large amount of fuel is supplied in poor combustion, which will lead to explosion. (7) Even if furnace is shut down, protection device take no action and more fuel is supplied, which will lead to explosion. (8) If the remaining gas inside burner is not emptied when the burner is shut down, this will lead to explosion

		of the equipment when it is re-started. (9) Negative pressure explosion, which is sudden shut down of furnace in operation and at the same time blower stops suddenly, with the sharp decrease thermal load of furnace and strong suction of draft fan, negative pressure inside furnace suddenly forms, which will lead to indent transformation, cracking or serious damage of equipment.
	Steam-water pipe blast	(1) The vapor-water shock damage during abnormal operation, thoughtless reduction amount of outer arc in elbow, serious overtemperature or long accumulated time of overtemperature, pipe wall thinning as a result of extended use, all of these can lead to pipe explosion. (2) Serious lack of penetration, welding crack caused by the slag in welding line, joint dislocation, intense fatigue cracking as the result of heat fatigue damage, as well as creep failure, all of these can lead to pipe explosion during operation. (3) Unqualified treatment of chemical water, internal corrosion due to ungraded oxygen and carbon removal, corrosion as a result of external factors, corrosion of furnace shut down, all of these will lead to under capacity of steel pipe which may cause pipe explosion. (4) Poor quality of pipe, defects of design, installation, inspection will cause pipe explosion. (5) Pipe explosion as the result of external force striking. (6) Accident potential of installation, support post breaking of vapour- water caused by serious water striking, all of these will lead to pipe explosion. (7) Man-made reasons such as incomplete safety management system, habit-forming operation against regulation, operator's inexpertness about running regulation, all of these will lead to pipe explosion.
	Pipe explosion accident of furnace	(1) As a result of uneven heating which will lead to uneven heating inside boiler, pipes may explode. (2) Unreasonable material selection or poor welding of boiler will lead to boiler pipe explodes. (3) Unreasonable design inside boiler, heating surface being unable to expand freely, poor supporting and ash deposition and so on. All of this can lead to boiler pipe explodes. (4) Due to long-term strong attrition to pipe wall from smoke, the pipe wall will be thinner and thinner, which will lead to pipe explosion. (5) As a result of failure of safety valve, pressure gauge, water level gauge, boiler overpressure or boiler short-water will happen, which may lead to pipe explosion. (6) Pipe explosion may happen as a result of pipe wall scaling due to poor treatment of boiler water.
	Boiler water shortage , overflow accident	(1) Operator violates labor discipline or failed to monitor water level carefully due to inattention during operation. (2) Fake water level occurs due to unreasonable structure of water gauge, vapour-water connecting pipe and cocks of water gauge, water column. (3) Poor lighting of water column leads to unclear observation of water level. (4) No alarm or false alarm as the result of failure of water level limit alarms at high and low. (5) Failure of automatic controller of water level. (6) Failure of feed valve or cut-off valve of boiler.
	Scald	(1) Personnel scald may occur if overheated steam of gas boiler leaks or staff touches unprotected hyperthermal pipe or steam. (2) If the hyperthermal exhaust gas of air preheater leaks or hyperthermal exhaust gas pipes is not insulated, any personal touching will lead to scald accident.
	Fall accident from high place	During overhauling of boiler, fall accident from high place may happen if there is any breach of safety regulation or damage of protective equipment.
	Mechanical injury	Mechanical injury may occur if workers touch the unprotected rotating or driving equipment during the high-speed operation.
	Poisoning and suffocation	Gas of this project contains methane, carbon monoxide, hydrogen, etc. During the gas leaking accident, poisoning and suffocation will take place if workers enter into the limit space or place with poor ventilation and inhales gas that exceeding limits.
	Electric shock	Electric shock may occurs as a result of short circuit of electrical equipment, bad earthing, insulation line damage, connection of temporary line randomly, unlicensed operator or rule-breaking operation.
	Noise and vibration	Strong noise and vibration will be made during the operation of boiler, fans and all kinds of equipment. Especially the exhausting noise of boiler ignition and furnace shutting down can reach up to 140dB (A). Workers under environment of strong noise will fell harsh and uncomfortable. For a long term, hearing damage and even deafness of different degrees will occur to them.

Thermal automation system	Failure of detecting, control and actuating system	(1) Equipment (facility) defects a) Conduct one-time thermal test on component failure (e.g. no indication of pressure, temperature and flow gauge, indicating maximum and minimum values, and no variation of indication value), including mainly one-time test on the damages of component and transmitter (disconnection/short circuit). Wrong information will mislead operators into making incorrect judgment on unit operating conditions and lead to misoperation, unit protection failure/malfunction or out of control of self-regulating mechanism, the operation of unit will thus be affected. b) Power failure of power system (e.g. loss of working power supply for thermal DCS (distributed control system) in main control room; loss of working power supply for power distributing panel of on-site control valve; loss of AC/DC operating power supply for the thermal protection system), it mainly includes disconnection of thermal power circuit, breakdown of overload fuse gear, tripping of power switch caused by short circuit of power circuit Power failure of thermal power system will paralyze thermal system, lead to unit out of control and may cause bodily injury or equipment damage accidents. c) Malfunction of unit DCS (distributed control system) (e.g. system halted/blank screen/no variation of CRT information display/malfunction of keyboard and mouse operation), it mainly includes controller or I/O module damages and no redundant configuration and reliable backup emergency operation method is adopted. Or, the unit loses out of control since the operator station or the configurations of some hardware/software operation buttons fail to meet the requirements of such unit works under different work conditions, especially the needs for handling emergency breakdown, therefore, main equipment damages or bodily injury and death will be caused. d) Out of control failure of self-regulating system (e.g. the regulating valve is opened suddenly to a greater degree or closed to a smaller degree, oscillates and no operation of its self-regulating mechanism can be found.) It mainly includes disconnection, short circuit and damage of one-time detecting elements for regulating use or regulator, or the regulating signal is abnormal caused by jam fault of actuating member, dropping of pull rod pins and bending, deformation of pull rod and as a result the regulating valve is opened suddenly to a greater degree or closed to a smaller degree or no operation of its self-regulating mechanism can be found.) Out of control of self-regulating mechanism of the unit will affect its safe operation and may cause bodily injury, death or equipment damage accidents. e) Network loop failure (e.g. communication blackout caused by disconnection of communication circuit; system halted as a result of communication interface failure; system halted as a result of high traffic and blockage),it includes mainly disconnection of communication circuit caused by mechanical damages, or the actual communication volume during unit operation is greater than predefined value, or the communication interface assembly is damaged. The failure of communication network loop will paralyze thermal system and cause unit to lose out of control, even it may result in bodily injury, death or equipment damage accidents. (2) Protection defects a) Malfunction and movement resistance of unit protective system in heat power engineering (e.g. the unit working parameters are greater than danger limit values; no operation of protective system in heat power engineering; the unit working parameters is below limit value; beforehand action of thermal protection system), it includes mainly damages, disconnection of one-time detecting elements and components for unit protection use and fluctuations of their action setting-values, jam fault of trip valve for protection use or break of its loop. The malfunction and movement resistance of unit protection system will thus be resulted. Movement resistance of the unit protection system can damage directly safe operation of the unit and may cause bodily injury, death or major damages of the equipment. b) Grounding system fault (e.g. disconnection of thermal-controlled grounded circuit, increase of earth resistance value, damage of single-point grounded system and formation of multi-point grounding fault), it includes mainly corrosion and disconnection of earthing electrodes, increase of grounding resistance value, disconnection of ground lead caused by mechanical damages or loose connecting screws in ground lead. Therefore, the working stability of thermal self-regulating system will be affected and misregulation movements of the regulating valve, for example, it is suddenly opened to a greater degree or closed to a smaller degree, will be found. Or, unexpected contingencies will occur as thermal protection system and sequential control logic judgment and calculation is disturbed, as a result, safe operation of the unit will be affected and bodily injury, death or major equipment damages will be caused. c) Lighting impulse over voltage: The lighting impulse over voltage will cause breakdown of control

		cable and equipment of thermal control system and paralyze the system, affect safe operation of the system, major accidents like power outage across the whole plant and bodily injury, death will be caused in the case of consequences. Therefore, lighting protective safe measures must be adopted for computer control system.
	Fire disaster	The cables in automatic control system are arranged very densely, the fire-resistant measures are not adopted in a down-to-earth manner, it includes mainly: no fire-proof sealing, no application of fire resistant coating in accordance with relevant requirements; in case of cable failure and burning, serious fire disaster will be caused to damage severely and lose the whole system of the power plant out of control, the losses can never be restored.
	Electric shock	(1) Protection defects (2) Electric shock accidents may be caused by defective or incomplete protective measures for grounding or zero-connection, earth leakage protection, safe voltage and potential coupling. (3) Design and installation defects (4) Potential safety hazards of the equipment or circuits like leakage of electricity, overheat, short circuit, loose contact, disconnection, insulation aging, breakdown and damages are hidden in case that design and installation defects of electrical wiring or equipment are detected or, necessary maintenance is lacked and protective installation cannot work any longer during their operations. (5) Break rules and regulations; (6) The electricians are not qualified and do not carefully carry out “two tickets, three systems” safe system; the electrified body is touched by accident as a result of no custodian in operation or incompetent custodian; electrical safety appliance (insulation tools, insulation pad, fence and warning signs) fails to be used properly in accordance with procedures; mandatory testing tools(test pencil，insulating rod and boots) fail to be tested on a regular basis or substandard ones are put into use; short circuit is caused due to misoperation.
Heat exchange station	Scald	(1) Scald accidents may be caused if hot water escapes from the pipelines and the operating personnel contact high temperature water; (2) Personal scald accidents may be caused if no heat preservation measures are adopted for high temperature pipelines or heat insulating materials are damaged, the personnel are exposed to high temperature pipelines or hot water. (3) Relevant personnel wear no protective articles when they contact heat exchangers and high temperature pipes or protective articles are not wore properly and scald can easily be caused. (4) The outlet of drainage device on the low point of hot water pipes(including the low point of each pipe section divided by segmented valve is not guided to a safe place, so scald is very easily caused if the operating personnel wear no protective articles or improper protective articles are wore when hot water is drained
	Electric shock	Electric shock accidents may be caused if there is electric equipment accident in the plant or electrical installation is not standardized without grounding or zero-connection system, or failure of grounding or zero-connection.
	Mechanical injury	Mechanical injuries may be caused during high speed operation process of various mechanical equipments if no protection is set for their rotating or driving device.
	High temperature	High temperature hazards may be easily caused if heat exchanger or high temperature pipes are contacted.
	Falling accidents	Falling accidents are easily caused if the maintenance staff do not have enough protective measures when they enter into the valve chamber. The overhaul of equipment and pipelines at the first section of heat network involves high altitude jobs, falling accidents will occur if inappropriate protective measures are adopted.
	Explosion of vessels	If safety protective devices like relief valves of pressure vessels (deaerator, heat exchanger) are failed, explosion of vessels may be caused by overpressure operation.
Heat supply pipelines	Pipeline leakage	(1) Pipeline corrosive failure Corrosive failure is one of common failures of long-distance pipelines. Corrosion may reduce thickness of the pipes in a large area to cause excessive deformation or blasting and also, cause pipe perforation triggering leakage accidents of thermal pipelines. In comparison to atmospheric corrosion of above-ground pipelines, the possibility is much greater for buried pipelines to cause severe damages as their corrosions are very hard to be found by the management and handled in time. The buried pipelines are affected by soil type, soil resistivity, soil moisture content (humidity), pH value, content of sulphide, oxidation-reduction potential, microorganism, stray current and interference current in their neighborhood, so electrochemical corrosion, chemical corrosion, microbiological corrosion, stress

		corrosion and interference corrosion will occur. (2)Third-party damages Third-party damages refer to harmful effects of external force to pipeline system. The external force is classified into natural external force and man-made external force. Third-party damages in heat distribution pipeline system are mainly caused by man-made external forces. Man-made external damages can be classified into direct man-made external damages and indirect man-made external damages. Direct man-made external damages means that the transmission and distribution facilities are damaged by man-made factors exerted directly on them and pipeline leakage accidents are caused. In recent years, it has been a common phenomenon that heat distribution pipelines are damaged by theft of heat energy and they are dug, shoveled and pressed to cause damages to themselves and auxiliary facilities as a result of road construction. Indirect man-made external damages refer to those caused by man-made factors exerted indirectly on transmission and distribution facilities, for example, structures are built or heavy objects are piled above buried pipelines to cause damages day by day and month by month. Once the pipeline bursts, catastrophic accidents are very possibly caused. In addition, the buried pipelines will also be damaged by surface cars because of their unreasonable depth design. Traffic flow on road surface, nearby construction site, cross manifold, illegal occupation, sunken pavement and unreasonable buried depth of gas pipelines are all closely related to third-party damages.
	Pipeline damages	1) Overpressure During the operation process over a long period of time, the pipeline inwalls will suffer scour, wear and corrosion from the medium, the pipeline outwalls will be corroded by air and rain, their thickness are reduced day by day to withstand no pressure from the medium, local pipeline burst is possibly caused. 2) Pipeline fatigue failure The damages of pipelines suffered under alternating stress are called fatigue failure. The alternating stress can be considered as such a stress that is produced from loads and changes with time period or without any regular changes. The damaged caused by alternating stress are distinctively different from that caused by static stress, sudden damages will be caused after a long period of repeated actions even if the alternating stress is smaller than yield strength of the material. Pipeline vibration will be caused by heat distribution pipelines when they go across highway foundation and vibrate, hot water will produce irregular pressure fluctuations inside the pipelines and alternating stress is thus caused. The open pores or branch connection, internal defects of weld seam like butt joints, edges, reinforcement, undercuts or slag inclusion, porosity, crack, under welding and fusion will be inevitably encountered during the manufacturing process of pipelines and equipments, these geometric discontinuities will cause stress concentration. Fatigue cracks will be caused at these geometrically discontinuous or defective parts under alternating stress, which will spread progressively until permeate the whole wall thickness at the end and hot water leakage accidents are thus resulted. In order to eliminate the great stress caused by expansion of main pipes, the main pipe is installed with thermal expansion compensator. If the main pipe is too inferior or installation is too substandard to withstand medium pressure inside the pipelines, burst are possibly caused and hot water will escape from the pipelines. If pipelines are connected improperly or gas is detected above horizontal pipe section, water attack is possibly caused to result in violent vibration. Fracture of flange surface of pipeline weld seam or expansion compensator is possibly caused if serious vibration is encountered. The highest part of convex pipelines of heat supply mains shall be installed with gas pipelines, if protected improperly and operated mistakenly by passers-by and kids, scald accidents may be caused by high temperature water. 3) Changes of engineering geologic conditions will cause deformation and crack of pipe network and result in burst.
	Scald	(1) If the thermal barrier of pipelines is damaged, the maintenance staff will be scalded when they touch outer surface of the pipelines. (2) Leakage of high temperature water is easily caused by damages of accessories like valves and compensators, the maintenance staff shall keep themselves away from high-temperature water.
Power supply and distributio n system	Electric shock	During the operation of power supply equipment and device, poor insulation as the result of poor quality, insulation aging damage due to bad insulated property, serious in-site environment (high temperature, humidity, corrosion and vibration), improper operation, mechanical injury, and poor maintenance. Imperfect safety and safety technology measures, operation against rules, protection failure and so on. If body touches or being close to the charged part, electric shock may happen. Especially for the HV equipment and circuit, the risk of electric

		shock is higher as it HV value and strong electric field.
	Fire disaster	As for all type of high-low distribution device, electric device, electric equipment, lighting facilities, cable, electric circuit and so on, electric sparks, arc, or overheating will occur as the result of improper installation, closing to external fire source, opening and closing during normal operation, overloading of abnormal operation, short circuit, overvoltage, grounding failure, poor contact and so on. Fire disaster may happen if there is no proper protection, which may lead to electric fire disaster or ignition of flammable materials surrounded. Once the current is overloading, wire (include bus, switch) will overheated and the vaporization of metal will cause explosion. The risk of oiled electric equipment (oil transformer, voltage transformer and so on) is much higher, which may lead to fire disaster.
	Lightning strike	Power transformation and distribution devices of outdoor substation, wiring, brackets, box-type substations and electric rooms maybe suffer lightning stroke. If the lightning protection setting is unreasonable, construction is irregular or grounding resistance value does meet the requirements, lightning will seriously damage buildings and facilities though overvoltage within its affecting scope and may be fatal to the personnel. Strong lightning will generate extremely high voltage to the ground in the strike point and its connecting metal part, which may cause shock accident as the result of touching voltage or step voltage. Heat effect of lightning current can also lead to electric fire disaster.
	Other injuries	Continuous water and power are required to supply to the parts, such as fire extinguishing pumps, smoke sensors, alarm and personnel evacuating instructions, dangerous and hazardous gas leakage detection, lighting of safety entrance, dust removal blower, oxygen lance elevator mechanism, water pump of evaporation cooling device, furnace, oxygen lance, smoke cover and so on. Once water and power supply stop, the water pump will stop running, which will danger the lives of personnel. In additional, maintainers of substation outside may fall down.
Plumbing and firefighting system	Mechanical injury	During running and overhauling of water system equipment, such as pumps, there is no protective cover equipped or cover damaged for the rotating part. Deficiency of protective blocking device, emergency stop switch in site, safety chain lock device will lead to bareness of rotating parts which may cause mechanical injury. In addition, protective device damage as the result of lack of checking and maintenance, operation against rules may cause mechanical accident.
	Electric shock	During operation and overhauling of equipment such as water pump and so on, electric shock may happen due to the following reasons: electrification of equipment which should not be charged as a result of circuit failure, grounding failure, protective device failure of equipment or circuit, operation against rules (For example: entering into tank without using portable lighter of 12V), which will lead to electric shock. Scald may happen as a result of arc caused by equipment circuit or misoperation.
	Drowning	Drowning accident may happen if this is protective fence for recycling water pool or operation again rules.
	Lifting injury	If electric hoist or some other lifting equipment is equipped in the water pump room, lifting injury may happen as the result of falling accident caused by contact failure in dead zone, commanding failure, unclear signal, misoperation, loose binding of lifting wares, improper fixing of hanger, elements of lifting mechanism malfunction and so on. During the falling procedure, potential energy transforms into motion energy so that serious lifting accident may occur as a result of object unexpected falling or falling of lifting metal structure.
	Noise	Noise made by the high-speed running equipment, such as water pump and so on.
Warming, ventilation and dust removal system	Electric shock	Poor maintenance and overhauling of ventilation and AC device, distribution box, control panel, lighting and circuit and so on in daily life may cause power leakage of electric equipment as the result of electric aging, external damage etc., which will lead to electric shock if there is no grounding protection, leakage protection or protection failure. If the protective cover of circuit paving on the ground damaged by the external force and insulation is broken, the exposing of charged metal wire may cause electric shock. Poor training of operator, unqualified staff on post, operation against rules or misoperation etc., misapplication of safety tools and so on can cause electric shock accident.
	Mechanical injury	If fans and cooling equipment without installation of protective cover, blocking device of protective cover, in-site emergency stop switch cause lack of safety protective devices, it will lead to mechanical injury accident during operation as a result of exposing of rotating part. In addition, the protective devices of the machines above with poor checking and improper maintenance will lead to mechanical injury accident.
Defects in safety management	(1) If safety production management institution or full-time safety management personnel as required is not equipped, it will be so hard to exert determination of safety regulation of the leaders in order, which will seriously effect safety management operation of enterprise. (2) If the enterprise safety production responsibility system is not implemented in all levels, mutually making excuses or nobody caring about the safety work will happen. (3) If safety production management system is uncompleted, random operation and frequent safety accident will occur. (4) If enterprise safety operation regulation or post operation procedures are uncompleted, safety accident will happen as a	

	result of random operation against objective law of safety operation. (5) Principal and management staff lacks necessary professional safety knowledge, have no enough understanding of safety laws, regulation, rules. State safety operation regulation cannot be effectively implemented and safety operation is failed to be ensured. Sometimes commanding against rules may happen. (6) As ignoring of safety training and education, safety awareness and actual operating skill cannot improve. Unsafe action such as ignoring self-safety, operation and commanding against rules, rash operation may happen frequently. (7) If safety investment of enterprise cannot be guaranteed and too many historical outstanding loan exists, the safety operation of staff cannot be ensured. (8) Enterprise makes no emergency plan, which may lead to serious consequences such as accident propagation and so on. (9) Lack of foundation work of safety management is also an important defect of safety management. (10) There is no hidden danger identification organized and taking no survey and analysis after unsafe situation occurs.

9.2.4 Environmental Risk Analysis

1. Environmental risk analysis at design stage

Design defects of the unreasonable general layout design, buildings and structures, heating pipelines and the power distribution system and the lack of the design of responses to the natural disasters shall cause accidents and risks in the design stage, which will influence on the subsequent construction and operation and cause the property damage and even the life safety threat.

2. Environmental risk analysis at construction stage

Due to the welding quality defects of pipe orifices, the bad pipeline corrosion control, the damaged anticorrosive coating and the fatigue cracks of pipes caused by the careless pipe handing during construction activities, pipes would leak to affect the normal heating in the future during operation. Besides, the accidents of fire, machinery and vehicle hurts and electric shocks shall endanger personal safety.

3. Environmental risk analysis at operation stage

A. The leakage of heating pipe network

All sorts of leakage risks and accidents of heating pipeline network mostly happen during operation. If the pipe leakage happens to the heating pipe network, it is at risk of empyrosis. And it also causes the abnormal heating for the residents within the heating scope. As a result, their life quality is affected. The explosion of the heating pipe network may cut the heating and power and hurt pedestrians and vehicles.

B. The leakage of natural gas

Natural gas in in Zhangjiakou subproject is one of hazardous chemicals. It is transported from the gas company through pipes to be fed into the boiler after voltage regulation. There doesn't exist the storage device. The quality of natural gas in the pipes is far from the critical mass 50t. Therefore, there is no major hazard of dangerous chemicals in this project.

C. Boiler explosion

The two gas-fired boilers are upgraded in Zhangjiakou subproject. When the working pressure of boiler operation is more than the maximum allowable working pressure, which is caused by the boiler design, manufacturing defects, water shortage and abnormal pressure, explosive accidents are easy to occur to hurt the surrounding workers. Steaming-water pipe blasting outside of the boiler is the most dangerous and most frequent accident in the turbine equipment and its systems, which may cause the burning casualty accident.

D. Natural disaster

Earthquake can destroy buildings and cause the loss of life and property. And it is easy to lead to

the secondary accidents, such as fire, explosion and pollutants' leakage, which will play a negative influence on the factories, the surrounding water and atmospheric environments and the agroecological system.

4. The summary of environmental risk analysis in this project

In conclusion, the occurring accidents are mainly caused by the improper mechanical equipment and instruments or violation of the instructions and misoperation. So construction organizations must strengthen management and operate strictly in accordance with the construction regulations during construction. The main risk is fire explosion in this project during operation. Hence, organizations must take strict precautions against the gas explosion and the leakage of pipes. And they should make a strict safety management code and strengthen management to reduce the danger to minimize the risk.

The comprehensive analysis and evaluation show that there are no major hazards in this project. The main risk or harmful factors are fire, explosion, boiler explosion, electric shock, scald, intoxication, asphyxia, mechanical injury (vehicle injury), falling accident, object strike and noise hazard, in which the major risk factors are fire and explosion. These dangerous factors can be avoided and eliminated after the prevention and mitigation measures are adopted.

9.3 Environmental Risk Prevention and Mitigation Regulations and Measures

9.3.1 Environmental Risk Prevention and Mitigation Measures in Design Stage

The following measures should be adopted in accordance with the national relevant provisions and documentation requirements:

A) Buildings and structures shall be designed in accordance with Earthquake Resistant Design Code and set up defenses against 7 degree seismic intensity.

B) Organizations should ensure the fire rating of buildings and structures and set up the effective firefighting system.

C) Organizations shall choose the low-noise pumps and set up the damping foundations and sound arresters.

D) Water supply and sewerage work and heating system shall be set up in buildings and structures to ensure the drinking water quality and emission standard.

E) Organizations shall ensure the good natural lighting and ventilation to create a health and sanitary working environment in every building and structure.

F) Safety net distance between electrical equipment of all the voltage levels must be no less than the minimum distance in accordance with the relevant regulations. Locking device should be installed to improve security between the electrical disconnecting switches and earthing knife-switches of circuit breakers. All the electrical equipment shall be installed with the leakage protectors and safety grounds.

G) Fluorescent lamps, waterproof lamps, corrosion-proof luminaires and emergency lighting fittings shall be adopted respectively in the different lighting areas of buildings.

H) If the temperatures of instruments and the surface of pipes are equal to or larger than 50℃ in thermal stations, thermal insulation shall be set, which can not only save energy, but also prevent burning and thermal radiation.

I) Valve manholes in heating network shall be designed in accordance with *Design Code for City Heating Network* (CJJ34—2010).

J) The design of DCS system of gas-fired boilers shall comply with *Technological Code for*

Furnace Safeguard Supervisory System in Fossil Fuel Power Plant (DL/T1091-2008).

K) Doors of equipment rooms in station buildings shall open outwards. If the length of a thermal station building is larger than 12m, it shall set up two doors.

L) Drain pipes connected with the safety place shall be installed on the safety valve of hot-water pipes and instruments. And it shall have enough sectional area and antifreezing measures to ensure unobstructed emissions. It is prohibited to install valves on the drain pipes.

9.3.2 Environmental Risk Prevention and Mitigation Measures at Construction Stage

The corresponding environmental risk prevention and mitigation measures are put forward based on the major risk analyses, which are shown in Table 9-4.

Table 9-4 The Environmental Risk Prevention and Mitigation Measures at Construction Stage

Risk	Prevention and Mitigation Measures
Pipeline Construction Risk	A) Proper insulation materials are selected and prevented from corrosion. Fittings, such as valves and compensators, shall be also selected properly. Clear height shall be enough when steam pipes cross pedestrian pathways and roads. Height limiting signs shall be set up on the roads. B) Buried depth of pipelines complies with the regulations and is calculated through the stability checking. Type selection of compensators is determined by calculating, whose unfavorable work conditions need to be considered. The proper fittings shall be selected and their welded junctions shall be inspected 100%. Thrust of fixed frame is determined by calculating and its unfavorable work conditions need to be considered. Lime-soil cushion is lied down and tamped during pipeline foundation construction. It shall consider the local seismic intensity in foundation treatment and pipe laying. C) Buried depth of pipelines complies with the regulations and is calculated through the stability checking. Lime-soil cushion is laid down and tamped during pipeline foundation construction. It shall consider the local seismic intensity in foundation treatment and pipe laying. D) It shall strengthen the exhaust unit of pipelines and instruments and reduce the remaining air in pipelines and water circulating pumps. Exhaust valves shall be set up at the high points of pipelines. Water shall be infused into piping system to exhaust air before starting pumps. After that the remaining air is exhausted. The water pump with stable quality shall be selected. And it shall strengthen the maintenance of instruments. Outlet valves and rebound valves should operate reliably and be maintained regularly. Besides, it shall strengthen the network load adjustment and avoid the dramatic change of temperature. The opening and closing time curve of outlet butterfly valve of water pumps shall comply with the designing requirements. It shall avoid the water hammer caused by the pressure change in the pipeline because of quick opening. It shall ensure the unobstructed drain of steam pipelines and heat pipes completely before starting. E) Exploration results in the early stage show that the route selection of pipe network doesn't intersect with other municipal pipelines. It should strengthen the exploration work in the design and construction. Once the unidentified pipeline is found, investigation and instruction should be conducted promptly to prevent damaging the municipal pipelines. In the area where other pipelines are parallel to or insect with heating pipelines, measuring and paying-off should be done carefully to indicate the relative location relation. When they are close to each other, instead of mechanical excavation, artificial manual excavation shall be adopted. For the close construction of pipelines of gas, water and important optical fibers, personnel in the related department shall be informed to present and make the emergency preparations. F) The detail information of pipeline route and buried depth shall be informed to the related planning, municipal, communicative, electrical, power and gas departments before construction. The diagram of pipelines managed by other departments shall be given in the section of heating pipelines.
Mechanical (vehicle) injury, electricity safety risk	A) Construction machinery and tools with acceptable quality, complete safeguard and electric protective devices shall be selected. B) As transportation quantity is large during construction and traffic is heavy on the surrounding roads, the influence on construction period and safety shall be considered fully. So the safety sign shall be set up and working time and task shall be arranged properly. C) Lighting devices shall be installed in the construction at night or with poor light. D) All the mechanical facilities and electrical safety equipment shall be checked regularly so that safety problems can be found and solved promptly. E) Safeguard devices and electricity safety instruments of all the mechanical facilities shall be sensitive and effective. F) Fire prevention work shall be done well and the necessary firefighting equipment shall be equipped. G) Operation and using of mechanical facilities shall strictly comply with the operating regulations. H) Operations shall be taken strictly in accordance with the construction regulations. And it is prohibited to construct against

	rules. I) Fly-over crossing work shall be minimized during construction.
Acetylene gas explosion risk	A) The sign on the spherical part of cylinder shoulder shall be checked carefully before using. The next pressure test time shall be especially paid attention to. The technological checking of cylinder shall be conducted regularly in accordance with requirements during use. It is prohibited to use the cylinder beyond the checking deadline. B) External inspection of cylinder valves, pige tread and pressure reducers shall be firstly made. If air leakage, thread slipping and ineffective or climbing clock are found, maintenance shall be conducted promptly. Random disposal shall be avoided. It is prohibited to tighten the valve stem and adjust the bedding under pressure. Soapy water shall be used to check leakage, rather than open fires. Insulation shall be bedded on the bottom of cylinder to prevent electrification, when cylinders and electric welding are used in the same place. Grounding devices shall be installed for pipes and facilities connected with cylinders to prevent fire and explosion caused by static electricity. Frost phenomenon may happen to cylinder valves or pressure reducers in winter. Hot water and steam can unfroze them, instead of fire and iron. Adjusting screw of pressure reducers can't be wrenched to avoid leaking a large amount of air to cause accident. C) Violent vibration and hit shall be avoided in the process of using, storing and transporting cylinders. And they shall be carried and moved lightly. The special lifting supports and plain trolleys must be used. And wire ropes are forbidden to hoist cylinders directly. Handrails and supports shall be used to fix the cylinders to avoid toppling. D) Cylinders shall be far away from high temperature, open fire and molten metal splash, whose distance shall be more than 10m. And they can't be under sun exposure in summer. E) It shall be slow to open cylinder valves and pressure reducers to avoid fire and explosion of cylinders and pressure reducers caused by electrostatic spark discharge of jet stream, thermal collision of solid particles and heat liberated by the sudden compression (adiabatic compression). F) Proper acetylene gas pressure reducers and flashback arrestors must be used. G) The temperature of the surface of cylinder can't be more than 40℃. It must be touchable by hands in the using process. If the local temperature is more than 40℃, which is a little hot, it should stop using promptly. And it shall be sent to gas-filled unit to check after cooled in the water and dealt with properly. H) Acetylene cylinder must be upright when stored and used. It can't lie down to avoid fire and explosion caused by outflow of acetone. Pressure reducer can be installed to be used after acetylene cylinder is upright for 15 minutes. The cylinder valves can only be opened for three quarters of the circle in general, which can't be over one and a half circles. I) The rooms where the acetylene cylinders are stores muse be ventilated to prevent the leaking acetylene gas from detaining. J) The distance between acetylene cylinders and oxygen cylinders can't be less than 5.0m.
Safety production management defect risk	A) The work safety guideline "Safety first, Prevention primary, Treatment comprehensive" must be carried out carefully. B) Workers must strictly abide by three main rules which are that helmets must be worn into the scene, safety belt must be fastened at high altitudes and objects are forbidden to fall from the high altitudes. C) The safety production responsibility must be implemented and production organization and management must be improved. D) The qualification checks of construction supervisors and organizations must be strengthened. E) Security training and education must be developed. Especially new workers and migrant workers who never take part in construction should be trained more. Different contractors should cooperate and communicate with each other to operate the construction safety work well in step in the construction site. F) Design and examination management and safety management in the trial operation stage must be strengthened. G) Construction units, exploration units, design units, project supervision units and other units related with construction and safety production must abide by the safety production laws and provisions to ensure the construction project safety production. And they must take their own responsibility of construction project safety production during construction.

9.3.3 Environmental Risk Prevention and Mitigation Measures during Operation Stage

According to consequence analysis of main risks, we put forward the corresponding environmental risk prevention and mitigation measures during the operation stage, with the details seen in **Table 9-5**.

Table 9-5 Environmental Risk Prevention and Mitigation Measures during Operation Stage

Category	Prevention and Mitigation Measures
Risks of pipeline network leakage	A) To have aseismatic design with earthquakes of magnitude above VII as safety factors to ensure that pipelines can go through the threat of earthquakes with magnitude being around VII. To avoid unfavorable sites such as soft soil areas and seismic fault zones to the greatest extent when laying pipelines. B) It's strictly forbidden to set up corrosive storage yards on sections with pipelines laid.

accidents	C) It's strictly forbidden to excavate and construct buildings that overload the bearing capacity of pipelines or engage in other producing activities above or near the pipelines. D) To have regular checks on heat supply pipelines as well as their accessories, and repair in time after malfunctions happen. A） To clean up the pipelines regularly and clear away the water and dirt in pipelines to reduce corrosion; F) To measure the pipeline wall thickness every three years and repair or exchange those whose thickness has reduced seriously in time to avoid the occurrence of pipeline explosion accidents. G) To check the pipeline safety protection system every half year, and add devices such as pressurizing valves to be able to deal with accidents happen when the pipelines are of overpressure safely, as well as to reduce the influence of hazards to the minimum level. H) It's strictly forbidden to construct within the pipeline protection scope. I) The marks in the penetrate points of railways, highways and rivers must be not only clear and definite, but also able to see clearly from different directions and viewpoints . J) To increase the inspecting frequency and improve the effectiveness of the inspection; to check pipeline construction areas every day and examine the surface conditions, and to pay attention to the personnel activities in these areas, if behaviors that influence the pipeline safety are found, to stop them, adopt corresponding measures and report to the superior in time. K) To check the pipelines that cross sensitive areas such as rivers, railways, highways and villages every day. L) To pay special attention to the safety of pipelines that cross rivers during the flood period. M) To prepare the environmental risk emergency plan and exercise such plan regularly.
Risks of boiler explosion accidents	A) To keep the boiler load stable and prevent the rising of air pressure caused by the sudden decrease of load. B) To keep the safety valves sensitive and reliable and prevent them from being out of order. To discharge them artificially every certain time and have auto-exhaust experiments regularly. If they can't be operated sensitively, they must be repaired in time. C) To verify pressure gauges at regular intervals to ensure that they show the accurate numbers. If inaccuracy or abnormality is found, they must be exchanged in time. D) To avoid water shortage. To control the water level within the normal one, and wash the water level frequently; to maintain and check the water-level warning devices or overheat warning devices at regular intervals. E) To avoid scale depositing. To use water treatment equipments properly to ensure that the water quality meets the standard. To clear away the dirt seriously and clean up the incrustation and granulating slag in time. F) To adopt effective water treatment and deoxidizing measures to ensure that the quality of supplied water and boiler water meets the standard. To strengthen the boiler maintenance work: clear away the soot in time, coat antirusting paint and keep the boiler dry. G) To keep the burning stable and avoid sudden changes in temperature. To strengthen the examination of stress concentration parts such as end sockets and turnings, and repair in time if cracks and grooves are found. H) To adopt reasonable design to ensure the quality of manufacturing and installation.
Risks of defects in operation and maintenance of heat exchange stations	A) To choose qualified thermal insulation materials and do anticorrosive work well. To select qualified pipeline accessories such as valves and compensators. B) When operating in the inspection room, the mouth of the well must be guarded by the specially-assigned person as well as rails. When entering into the inspection well, the operators must be careful and have good protective measures to avoid high falling accidents. The high-place operating personnel should be equipped with qualified protective articles. C) The electrical equipments must be of good ground protection to avoid electrification on shells. To check the electrical equipments before having maintenance work. The operating personnel must be equipped with necessary labor protection articles that are within the test qualified period.
Risks of defects in use management of natural gas	A) All kinds of main natural gas equipments, valves, bleeders, and pipeline trestles must be numbered with the numbers marked in obvious places. The management department should be stocked with the natural gas process flowchart, with the numbers of equipments and accessory devices marked on the Table; B) The connect junctions of branch pipelines on the main natural gas distribution pipelines (except for heat generator natural gas pipelines) must be equipped with reliable curtain appliances; C) When the forced air supply burners are adopted in burning devices, the branch pipelines of natural gas should be equipped with check devices or automatic block valves. The air conduits should be equipped with explosion venting films; D) The natural gas pipelines and air conduits should be equipped with low pressure alarm devices; E) The terminals of air conduits should be equipped with bleeders, with them being led to the place outside the factory; F) All the parts that need frequent maintenance should be equipped with reliable curtain appliances; G) The following positions should be equipped with bleeders: (1)The highest points of natural gas equipments and pipelines; (2) The terminals of natural gas pipelines and horizontal equipments; (3)In front of curtain appliances of natural gas equipments and pipelines: when the distance between the sluice valves of branch pipelines in front of or behind the curtain appliances of the pipeline network and the natural gas header pipe is within 0.5m, bleeders are not necessary; when the distance exceeds 0.5m, it should be equipped with bleeding ends;

	H) The ends of bleeders should be 4m higher than natural gas pipelines, equipments and walking boards, and no less than 10m distance from the ground. For the bleeders on natural gas pipelines and equipments that are installed in the factory or the place with its distance from the factory being less than 20m, their ends should be 4m higher than roofs. If the factory is really high and the bleeders are not used frequently, the height of their ends can be lowered appropriately, but it should be 4m higher than natural gas pipelines, equipments and walking boards. Natural gas shouldn't be diffused in or to the factory; I) The ends of bleeders should have rain-proof and anti-clogging measures; J) The roots of bleeders should be welded with stiffeners, with their tops being fixed with ropes; K) The bleeders of natural gas equipments shouldn't be shared, except for the centralized processing of diffused gas; L) The equipments and pipelines that are needed to displace natural gas or air with steam and nitrogen when stopping and sending natural gas should be equipped with steam or nitrogen pipe connections; M) The steam or nitrogen pipe connections should be installed on the above or side of natural gas pipelines, with the pipe connections being equipped with cocks or sluice valves. In order to prevent natural gas from entering into steam or nitrogen pipelines, the steam or nitrogen pipelines can only be connected with natural gas pipelines when there is steam or nitrogen in the pipelines; if they are not used, they should be disconnected or blocked with blind plates; N) The main natural gas pipelines in the factory should be marked with obvious signs to show natural gas flows and types; O) All places that natural gas may leak should be hung with warning marks to warn people; P) Natural gas regulator stations can be located in the open air or a separate factory, with the outdoor regulator stations having solid enclosing walls whose distance from the pipelines should be no less than 2m; Q) The operating rooms of regulator stations should be equipped with pressure gauges, flowmeters, high-low pressure alarms and telephones. The operating rooms should be separated from regulator stations and equipped with two doors opening outward; R) There should be safety valves in the voltage-regulating system, with them meeting the related regulations of the existing management of pressure vessels.
Risks of natural gas on fire	A) If natural gas is on fire, we should report to the natural gas protective stations rapidly, and meanwhile, inform the fire brigades to fight the fire in the sites; B) If the natural gas pipeline whose diameter is more than 100mm catches fire, we are not allowed to turn off the valves directly; instead, we should turn off the valves gradually according to the pressure shown in the pressure gauges, and send a large amount of steam or nitrogen into the natural pipeline to put out the fire. The minimum natural gas pressure in pipelines mustn't be lower than 100Pal; C) We can use high pressure water to put out the fire; but if the equipments are burnt red, we shouldn't spray water suddenly to avoid the deformation and breakage of pipelines' D) When the natural gas equipments catch fire inside, we should first confirm that there are no people inside; then we should close the man hole immediately and stop bleeders to send in a large amount of steam or nitrogen to put out the fire.
Risks of natural gas explosion accidents	A) The boiler firing work must be done according to operating procedures; B) Before the firing work, the flue shutters of the boilers should be opened, as well as the boiler doors and wickets, to deal with the remained natural gas in the boilers with the natural convective method; C) The flues of new-built and reconstructed boilers must be of certain suction; if the flues are not dry enough, they must be dried at first; D) The firing work should be started with firing and then be sent in natural gas; the firing of boilers should use ignitrons generally, and under special circumstances, we can also put firewood or firers into the boilers in advance and then send in natural gas; E) If the first firing work fails, we should turn on the fans, open the flue shutters, and clear away the remained natural gas in the boilers; only after they are detected qualified can we do the firing work for the second time; F) The firing work must be done under stable natural gas pressure; G) For the force ventilated boilers, we should turn on the fans, open the flue shutters, and clear away the remained natural gas in the boilers before the firing work; then we should close the flue shutters and do the firing work; when all the burners are fired, we should open the flue shutters gradually and control the air quantity; H) The firing work of all the boilers should be started from the terminal burner and done successively. Once natural gas explosion accidents happen, the prior actions are as follows: A) To cut off the natural gas sources and deal with the remained natural gas to avoid the expansion of accidents; B) If the natural gas explosion is followed by fire accidents, they should be dealt with as natural gas fire accidents; C) If the natural gas explosion is followed by natural gas poisoning accidents, they should be dealt with as poisoning accidents; D) The burnt persons in accidents should be sent to hospital as soon as possible, shouldn't be washed or cleaned to avoid broken skins or infections; E) When rescuing burnt persons in natural gas explosion accidents, we should notice whether they have traumas when they run away from the fire; if they have traumas, we should pay attention to them to prevent them from being more serious.

Risk prevention and mitigation of natural disaster accidents	A) The project should have seismic fortification according to the seismic fortification intensity as well as ground motion parameters stipulated in GB50011-2001 and GB50032-2003. The corresponding characteristic periodic quantity of the seismic acceleration response spectrum of different site classifications should be determined by the division of characteristic periods. B) We should establish and perfect the seismic prevention and disaster mitigation system according to the policy of "prevention first, defense comprehensively"; all the buildings and structures should be planed, designed and constructed according to related seismic codes to improve the seismic capacity of all kinds of buildings. C) The laying of pipelines should avoid seismic fault zones to the greatest extent; when doing construction work in unfavorable anti-seismic areas, we should adopt corresponding engineering measures; it's strictly forbidden to do construction work in anti-seismic danger zones. D) Combining with the urban planning, we should keep a certain number of personnel evacuating shelters in heat source factories and heating stations to meet the requirements of urgent evacuation.

9.4 The Emergency Plan for Environmental Risks

1. Emergency Rescue Organizations

The emergency rescue command leading group which is consisted of the head of the company, responsible persons from the general office, technical department and capital construction department, as well as managers from key positions will be set up for major accidents. Among them, the general and deputy commander will be taken up by main leaders of the company, while members selected (or assigned) by each department. The emergency organization is consisted of the firefighting group, emergency group, material supply group, transportation group, alert and evacuation group, medicare group and communication coordination group.

The emergency command leading group is responsible for establishing and revising the emergency plans of their company; organizing emergency rescue teams and the implementation and drill of the plans; checking and supervising all kinds of preparations for accident emergency rescues; implementing rescues according to the emergency rescue plans when accidents happen. It should also check and control the daily potential safety hazards, determine the important checking and prevention parts through frequent investigations on potential hazards, analyze the possible secondary disasters and derived disasters comprehensively, assign the corresponding emergency disposal measures to cut off pollution sources and abate or reduce pollution, and establish related working files.

It should implement emergency supporting measures and get to know the types, quantities, storage places and application methods of their emergency materials and equipments; at the same time, it should also get to know the related conditions such as the contact information and stock status of enterprises around who have the emergency materials and equipments.

Once an accident happens, it should initiate the emergency plan immediately, implement premature handling, cut off risk sources with all its strength, launch emergency monitoring and adopt effective measures to abate and reduce pollution, prevent the expansion and upgrading of emergent environmental accidents as much as possible and reduce the damage to the environment to the maximum extent. Meanwhile, the persons at sites or discovers should inform the emergency rescue command group in first time and report to the local government and functional departments such as the Safety Department and Environmental Protection Department about the truths to give them references about having correct judges and scientific decisions and buy time for receiving supports from the superior government and society as soon as possible.

2. Emergency Division (Responsibilities)

General Commander

To be responsible for announcing the initiation and removal of emergency states, commanding and mobilizing emergency organizations comprehensively, allocating emergency resources, and organizing the implementation of emergency rescues according to emergency procedures.

Deputy Commander

To help the general commander do the specific commanding work of emergency rescues; to take full charge of the emergency rescue work if the general commander isn't in.

Firefighting Group

To make it to the accident sites immediately to have the firefighting work or emergency rescue work when great fire disasters or other major accidents happen.

Emergency Group

To fight the fire, repair equipments, and reset equipments, make safety measures, and supervise and check the implementation of safety measures under emergency states.

Material Supply Group

To be responsible for guaranteeing the supply of emergency materials under emergency states, such as equipment spare and accessory parts, tools, sandbags, spades, firefighting foam, cement, protective articles, etc.

Transportation Group

To be responsible for guaranteeing transport vehicles.

Alert and Evacuation Group

To be responsible for setting up safety alerts to guarantee the site to be in good order; to implement traffic control to guarantee the site roads unblocked; to strengthen security work and strictly prohibit irrelevant personnel and vehicles from going through; to evacuate personnel under emergent circumstances.

Medicare Group

To be responsible for contacting medical institutions, organizing ambulances, medical workers and equipments to enter into the sites, and organizing them to save the wounded at sites.

Communication Coordination Group

To be responsible for the communication during the rescue process and guaranteeing the unobstructed communication; to be responsible for the coordination among different groups, as well as the connection and coordination with external agencies.

3. Emergency Procedures

Give the Alarm

When major accidents happen, the first discover should make the alarm call immediately to illustrate the general situations of accidents, such as locations and types of accidents, to the fire watchkeeper. He should also report to the emergency general commander and deputy commander about the accident conditions over the phone. If the accidents happen at night or on holidays, the discoverer gives an alarm to the administrative personnel on duty who then reports to the general commander and deputy commander about the accident conditions.

Receive the Alarm

The fire watchkeepers, administrative personnel on duty, general commander and deputy commander are persons who receive the alarm. They should ask about the time, locations and reasons about the accidents according to the reporters' names, units and contact numbers, report to the superior related departments, and do the call records well.

Organize Rescue Teams

After the emergency general commander or the deputy commander receive the alarm call, they should inform all the staff in the emergency command leading group immediately to arrive at the accident sites. After they receive the notice, they should organize their workers and rescue equipments to the accident sites immediately, report to the general commander at sites, accept missions, get to know the situations at sites and implement unified rescue work.

Set up Temporary Headquarter and Emergency Medical Point

After each rescue team enters into the accident sites, they should select favorable positions to set up the temporary headquarter and emergency medical point. Each rescue team should get as close to the site headquarter as they can and keep in touch with it at any time. The headquarter, each rescue team and medicare groups should set up striking signs and hang flags for rescue workers and the wounded to identify conveniently.

Emergency Rescue

Each rescue team that enters into the sites should carry out rescue work as soon as possible according to their respective duties and missions. The site headquarter should open the communication network as quickly as possible; find out the causes and hazard rating of the accidents rapidly and establish the rescue plan; determine whether to ask for external aid or not according to the severity of accidents; organize and command rescue activities.

Site Alert

The alert and evacuation group should be responsible for the site alert according to designated dangerous regions, and implement traffic control on the main trunk roads that lead to the accident sites. It should also set up warning marks at the boundaries of alert areas to prohibit other personnel and vehicles from getting close.

Emergency Medical Treatment at Sites

The medicare group should contact with the People's Hospital at the initial stage of the accidents, illustrate accident situations as well as casualties, and prepare for emergency treatment. The medicare group must give first aid treatment to the wounded at sites in first time with the principle of "the serious wounded first". After the wounded get treatment at sites, they should be sent to the hospital rapidly. The medicare group should do the handover work of the wounded well to avoid the repeated transfers among different hospitals for the critical patients.

Evacuation

To set up safety regions in advance. To organize and command personnel in polluted regions to evacuate from the accident sites.

4. Preparing Procedures of the Emergency Plan

The basic procedures of compiling the emergency plan for environmental risks are shown in **Figure 9-1**.

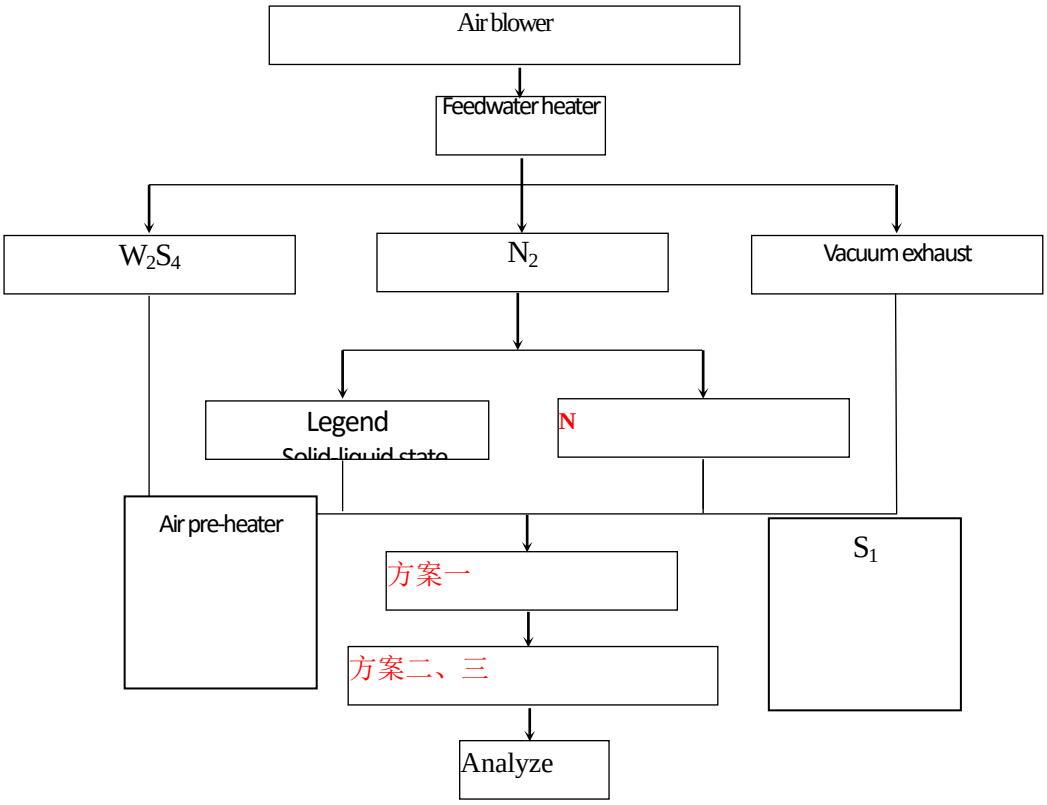


Figure 9-1 Working Procedures of Compiling the Emergency Plan for Environmental Risks

5. Main Content of the Emergency Plan

The compiling of the emergency plan for environmental risks should focus on considering the following aspects:

A) The emergency plan, program, and procedures must be established.

In order to deal with accidents orderly after they happen, we should establish the emergency plan and program before the commissioning of the project to be prepared for accidents.

B) To set up the emergency rescue group for accidents.

We should set up the emergency rescue group that is consisted of main responsible persons of the company as well as departments such as the Production Department, Safety Department, Environmental Protection Department, and Security Department; once accidents happen, the rescue group should execute their corresponding duties in time to deal with the accidents.

C) To adopt evacuation measures after the accidents happen.

Once accidents happen, we should raise the alarm in time, and cut off the power, evacuate the crowds and rescue the wounded under the leadership of the rescue group.

D) To pay attention to have emergency trainings and drills regularly.

We should set up the emergency training plan for environmental risks, and determine clearly the contents, ranges, and frequency of the drills and trainings of the emergency plan.

E) To provide necessary appendix.

The appendix should include the duties, names, and telephone numbers of the internal emergency personnel, the external contact numbers, personnel and telephone numbers (the government departments, the road management departments that are paralleled with the

pipelines, rescue units, experts, environmental protection goals, etc), the geographical positions, regional positions and neighboring relationship of the units, the evacuation route of personnel in the area, arrangement diagrams of emergency equipments (prepared), etc.

The main contents of the emergency plan for pipeline fracture and leakage are shown in Table 9-6.

Table 9-6 The Emergency Plan for Pipeline Fracture and Leakage

No.	Item	Content and Requirements
1	General situations of hazards	The risk of pipeline fracture and leakage
2	Emergency planning zone	Along the pipeline network
3	Emergency organizations	To set up the emergency rescue command leading group for accidents, with the emergency rescue office set up under the leadership of it. Professional rescue team: to set up the professional rescue team, being responsible for controlling, rescuing and dealing with the accidents afterward. To establish the emergency rescue headquarters, which is responsible for overall command, rescue, control and evacuation works. Professional rescue teams: to establish the professional rescue teams, being responsible for the support for the company's professional rescue teams.
4	The classification of emergency states and emergency response procedures	To stipulate the levels of the accidents as well as the corresponding emergency classification response procedures according to the severity of the accidents.
5	Emergency facilities, equipments and materials	Emergency facilities, equipments and materials for explosion-proof pipeline accidents
6	Emergency communication, notification and transportation	To set up the communication team, and stipulate communication methods and notification methods as well as traffic management support and control under emergency states
7	Evaluation of emergency accidents	The professional teams are responsible for the evaluation of the characters, parameters and consequences of accidents to provide decision basis for the command department
8	Emergency protective procedures, and measures, methods and equipments of cleaning up leakage	Accident sites: to control the accidents, and prevent the expansion, extension, and chain reactions of the accidents. Adjacent areas: to adopt measures and equip with corresponding equipments to control the accidents.
9	Emergency dose control, evacuation organization planning, medical treatment and public health	Accident sites: to evacuate and rescue personnel at sites as well as in adjacent areas. Adjacent areas: to evacuate and rescue personnel
10	Termination and restoration measures of emergency states	To stipulate the termination procedures of emergency states; to deal with the accident sites afterward and restore measures; to relieve accident alerts as well as adopt restoration measures afterward in adjacent areas.
11	Personnel trainings and drills	To arrange for emergency rescue trainings and drills at ordinary times.
12	Public education and information	To educate, train and release related information to the public in adjacent areas along the pipelines.
13	Records and reports	To set up special records for emergency accidents, and establish files and the special report system, with the special department taking charge of it.
14	Appendix	To prepare for and form all kinds of appendix materials related to emergency accidents.

10. Impact of Resettlement Plan and Mitigation Measures

10.1 Land Acquisition and Mitigation Measures

10.1.1 Land Acquisition

Detailed investigation shows the proposed project does not involve acquisition of rural collective land or demolition of houses, and there is no impact on bridge/hydrology/electricity/telecommunications in four cities/counties, and no impact on cultural relics in Chengde and Zhangjiakou. Construction of primary heat exchange substations and heat stations in Xingtai, and pressure isolating heat exchange substations in Zhangjiakou will involve permanent acquisition of about 110 acres of planned state-owned urban development land. Additionally, there will be only a small amount of temporary occupation of planned state-owned urban development land. The resettlement impact about four subprojects is shown in **Table 10-1**.

Table 10-1 Resettlement Impact of Four Subprojects

Subproject	Impact of the Resettlement
Chengde Subproject	The primary network will be built on the motorway (only Dongchuan Road) or sideway along the built urban road; the connecting lines between primary network and heat exchange substations will all be laid on one side of the community road, involving no house demolition. There will be only a small amount of temporary occupation along the construction route.
Pingshan Subproject	The new primary network will be built on the motorway or sideway along the built urban road; the to-be-reformed primary network will also be built under the existing urban road; the connecting lines between primary network and heat exchange substation will all be laid on one side of the community road, involving no acquisition of rural collective land or house demolition. The construction of 36 newly built heat exchange substations and 8 reformed and expanded heat exchange substations will occupy 6.34 acres of state-owned land distributed in the residential area. The land is provided for free by the government for heating supply upon the request of the housing development and construction unit.
Xingtai Subproject	The subproject construction does not require the acquisition of rural collective land or house demolition. Although the newly built heat primary heat supply substation occupies 50 acres of land while the heat station needs 57.96 acres, such land is within the scope of the phthalic anhydride project of Xingtai RISUN Chemical Company. Anneng Construction Company has signed land lease agreement with Xingtai RISUN Coal Company about the project. Meanwhile Xingtai RISUN Chemical has paid land compensation to Shixiang Village and the affected households have signed land acquisition compensation agreement with the Shixiang village committee. Therefore there is no problem about the land acquisition.
Zhangjiakou Subproject	The newly built pressure isolation heat exchange substation occupies state-owned land on the coal boiler plot of China Unicom. The total area of the land is approx. 2.84 acres in which 1.58 acres are reserved for heat supply while 1.26 acres are allocated by the Qiaodong District Government for free. The construction of this heat exchange substation does not require the acquisition of rural collective land, house demolition or payment of land acquisition cost.

10.1.2 Measures for mitigating the impact

Following measures will be taken to mitigate adverse impacts caused by the temporary land occupation during the construction:

A) For pipeline laying along the urban road, semi-enclosed construction method will be adopted to keep space for pedestrians, bicycles and buses. Temporary roads/bridges will be built for convenient access, and necessary safety measures will be taken. In dense populated road section, construction activities will be better scheduled shortened construction period for minimizing

adverse impacts on residents, shops, and businesses.

B) During construction period, the construction material should be stored by type with management by special person. Construction debris and spoil should be cleaned in a timely manner to mitigate inconvenience to pedestrians.

C) For construction activities near schools and kindergartens, construction should be arranged as much as possible during summer holiday time. If construction during school time cannot be avoided, the construction plan should be improved to minimize construction period at school entrance, and relevant measures should be taken such as segmental construction which can leave sidewalk for teachers and students.

D) Water should be sprayed in construction site to reduce dust impact based on weather condition.

E) Limitation to construction time specified by local regulations and the local environmental protection department should be strictly followed. Transportation schedule and route should meet requirements of local government. Construction at night is prohibited. In the event construction at night could not be avoided, public notices should be made to the residents and local application procedures should be followed. Measures should be taken to reduce noise and dust impact, and mitigate traffic pressure caused by construction activities.

F) Before the construction commencement, the construction unit should post notice of construction including contain construction contents, construction schedule, responsible parties and contact person, and telephone number for complaints in surrounding area.

G) Operation noise of the heat exchange substation should be monitored regularly in operation period to ensure the compliance of applicable standards.

10.2 Affected person by the small boiler closure/demolition and corresponding reemployment measures

10.2.1 Impacts of the small boiler closure/demolition

Closure/demolition of small boilers in Chengde, Xingtai and Zhangjiakou will cause unemployment of seasonal boiler workers, 19 workers and 259 workers in Chengde and Zhangjiakou respectively need to be re-employed. All unemployed boiler workers are middle age male temporary workers whom are only hired for heating period without signing labor agreements or labor contracts with the employer. Field survey shows that income of the boiler workers could basically support their livelihood in local area. Adverse impacts of small boiler closure on the boiler workers are significant considering their lack of other skills, older age, and difficulty in getting new jobs.

10.2.2 Impact mitigation measures

In order to facilitate the re-employment of these seasonal boiler workers, effective mitigation measures have been developed by each subproject:

A) Advance notice (6 months) is provided to these temporary workers, so that they have enough time to look for new jobs.

B) Training, employment guidance and employment information are provided to help them to get new jobs as early as possible.

C) Chengde PIU will provide new job opportunities as coal and slag digging workers with higher income. The new position will not require any new skills as it is similar to current position. Additionally, the new position will provide better working condition such as working safety and comfort level of working environment.

D) Xingtai PIU will provide new job opportunities as pipeline inspection workers and heat station administrators in the Heating Company, and guarantee their income will not be lower than current level.

E) Zhangjiadou PIU will provide positions as repair worker, customer service staff, and cleaners. These job opportunities will be provide to affected boiler workers on priority. For those workers with long-time employment in the boiler room and with repair/maintenance skill will be given priority to be recruited as maintenance workers after the project completion to ensure less impacts for their livelihood.

During the field survey, nearly all the affected boiler workers support the project construction, and they believe the project implementation can improve local heat supply conditions and produce positive effect on the production and livelihood of the citizens. With other means of livelihood in the non-heating season, the boiler workers do not worry much about the income. They only hope that some temporary job opportunities could be provided in the winter after the project completion.

In addition, after the project is put into operation, the Hebei Provincial Project Management Office and PIUs will supervise over the entire process of re-employment for affected boiler workers, and respond to queries raised by the affected workers and enterprises and help to address issues. External resettlement monitoring institution will track livelihood recovery of these affected persons to ensure no income reduction due to the proposed project implementation.

11. Public Participation

11.1 Objective

The public participation activity (namely public consultation and information disclosure) is an important consisting part of project environmental impact assessment; the objective is to:

(1) Let project affected group and stakeholder to fully understand the environment impact (environment effect and adverse environment impact) possibly caused by the project construction, and mitigation measure to be adopted specific to the adverse impact, and guarantee the sufficient right to know the project construction. Thus the project construction can obtain the public understanding and support.

(2) Through public participation activity, obtain opinions and suggestions of the affected group especially the special sensitive groups and institutions, to facilitate the project owner and construction department finding out potential problems for timely modifying and improving the design scheme, and improving the environment impact mitigation measures. Benefits of the affected groups and related institutions shall be fully protected.

(3) Make the public supervision for project implementation condition through complaint response mechanism and information disclosure.

11.2 Respondents, Contents, Methods

1. Respondent

Respondents of the public participation activity are affected institutions and individuals in the project construction area. In particular to the institutions and individuals related to special sensitive respondents, such as schools, hospitals, residents, various relevant beneficial institutions and non-governmental organizations.

2. Content

According to provisions of *Provisional Regulations of Public Participation of Environmental Impact Assessment* (Environment Development 2006 No: [28]) and requirements of Environmental Assessment of the World Bank OP 4.01, this project needs to perform two rounds of public participation activities

The first round is the early-period project preparation stage before finalizing the environmental assessment outline. The main content of this round of public consultation is to learn about the awareness and understanding level of relevant stakeholders and public for the project, and their attitudes about the project and concerns for environmental and social impacts. Directly communicate and contact with affected group representatives and all stakeholders (institutions), including management departments and enterprises of municipal administration, road, railway, tourism, and communication. Opinions and suggestions from them need to be considered.

The second round of public participation activity is carried out after completing the draft of environmental assessment report. The main content of this round of public participation activity is to inform every stakeholders of potential environmental impact of this project and mitigation measures adopted specific to these impacts. Provide answer and discussion about their opinions and questions, and inform the public of compliant way of related environmental problems of this project.

At the project preparation stage, every environmental assessment units have assisted the PIUs to conduct two rounds of the public participation activities.

3. Methods

There are multiple methods for public participation activity, including consultation meeting, seminar, stakeholders interview, questionnaire, household survey, media notice and publicity, etc.

The public participation activity in the project preparation stage adopts the following activity methods: disclosure the project information in construction areas; questionnaire; general public/institution consultation meeting; independent interview of beneficial institutions, and symposium of environmental impact, etc.

The public consultation of four subprojects adopt the uniform formatted opinion consulting forms for both the individual and the institution; the sample and detailed content of two Table for Public Consultation are shown in **Table 11-1** and **Table 11-2**.

Table 11-1 Table for Public Consultation (individual)

[Table for Public Consultation of World Bank loan Hebei Clean Heat Demonstration Project]

Name: Age: Profession: Education degree:
Tel: Place of residence:

Your unit type: _____ (1) enterprise (2) business unit (3) government agency (4) others
1. How do you learn about the information that this project is going to build_____
(1) Broadcast (2) Newspaper (3) Network (4) Television (5) Others
2. Do you think if the project is good for local (urban area) heating status and economical development after being practiced_____
(1) Improve household gas status (2) Good for land development and utilization of pipe network covering area
(3) Good for promoting the urban economic development (4) Little effect (5) Not clear
3. Are you satisfied with heat supply status of the residential area at present _____
(1) Very satisfied (2) Satisfied (3) Relatively satisfied (4) Not satisfied (please explain the specific content)
4. What do you think that the main environment problems at present of this area are:_____
(1) Noise (2) Dust (3) Sewage (4) Air pollution (5) Others (mainly including)
5. What do you think that the main environment impact during the construction period of this project will be____
(1) Noise (2) Dust (3) Sewage and slurry (4) Traffic jam (5) Others (mainly including)
6. What's your attitude and requirement about the environmental protection measure to be adopted during the construction period of this project _____
(1) Approved and satisfied (2) Still need to improve and strengthen (particular opinions are)
(3) Not to mater
7. What's your attitude about this project construction
(1) Support (2) Conditional support (please state the reasons)
(3) Not support (please state the reasons) (4) Not to matter
8. What's your specific requirements and suggestions about this project

Table 11-2 Table for Public Consultation (institution)

[Table for Public Consultation (institution) of World Bank loan Hebei Clean Heat Supply Demonstration Project]

1. How do you learn about the information that this project is going to build_____
(1) Broadcast (2) Newspaper (3) Network (4) Television (5) Others
2. Do you think if the project is good for local (urban area) heating status and economical development after

being practiced_____

(1) Improve household gas status (2) Good for land development and utilization of pipe network covering area

(3) Good for promoting the urban economic development (4) Little effect (5) Not clear

)

3. Are your unit satisfied with heat supply status of the residential area at present _____

(1) Very satisfied (2) Satisfied (3) Relatively satisfied (4) Not satisfied (please explain the specific content)

4. What do you think that the main environment problems at present of this area are:_____

(1) Noise (2) Dust (3) Sewage (4) Air pollution (5) Others (mainly including)

5. What do you think that the main environment impact during the construction period of this project will be____

(1) Noise (2) Dust (3) Sewage and slurry (4) Traffic jam (5) Others (mainly including)

6. What's your attitude and requirement about the environmental protection measure to be adopted during the construction period of this project _____

(1) Approved and satisfied (2) Still need to improve and strengthen (particular opinions are)

(3) Not to mater

7. What's your attitude about this project construction

(1) Support (2) Conditional support (please state the reasons)

(3) Not support (please state the reasons) (4) Not to matter

8. What's your specific requirements and suggestions about this project

Unit name (seal):_____

Contact person: _____

Contact TEL: _____

Address: _____

11.3 Stakeholders Identification

According to the project construction characteristics, construction area, possible environmental impact, sensitive groups and institutions, relevant stakeholders of each subproject have been identified. Through identification, the stakeholders approximately include the following several types of units and groups: 1) units and groups directly benefited from the project construction (residential users and commercial users with heat supply service and heat measurement improvement); 2) units and groups under the environmental and social impacts for the project construction and operation; in particular to these units and groups with special sensitive targets; 3) institutions with direct relationship or impact with the project construction and operation; 4) institutions related to the project construction (mainly includes governmental department, social team and project implementing unit); 5) special group in above impacted groups (poor family, female householder family, women, children, the disabled, etc)

In fact, two types of stakeholders of the units and groups directly benefited from the project construction, and special group in the affected groups may include in the units and groups under the environmental and social impacts for the project construction and operation since they are located in the construction and operation area of the heat supply service. The special units and groups of local stakeholders identified by every subproject shall see **Table 11-3**.

Table 11-3 Table of Relevant Stakeholders Identification

Type / Sub-Project	Relevant Stakeholders		
	Affected Units and People under the Environmental and Social impacts during the Project Construction and Running	**Organizations with Direct Relationship or Impact During the Project Construction and Operation**	**Organization related to Project Construction**

Chengde	Residents from 10 places including Shuixie Huadu area; schools and students in Ethnic middle school and others; the No. 266 Hospital; fireman of closed boiler room, etc	Municipal Environmental Protection Bureau, Municipal Cultural Relics Bureau, Municipal Housing and Urban-Rural Construction Bureau, Municipal Planning Bureau, Municipal Tourist Bureau, Municipal Administration Group, Municipal Water Supplies Bureau, Municipal Traffic Police Branch	Municipal National Development and Reform Commission, Municipal Traffic Bureau, Municipal Land and Resources Bureau, Municipal Bureau of Civil Affairs, Municipal Labor and Social Security Bureau; Municipal Women's Federation, Municipal Disabled Persons' Federation and other organizations; Niuquanzigou Subdistrict Office in Qiaodong District, Toudaopaikou Subdistrict Office, Xiaerdaohezi Subdistrict Office, Panjiagou Subdistrict Office, Qiaodong Subdistrict Office; Chengde Heat Power Group Co., Ltd.
Pingshan	Residents from 20 places including Kangxinjiayuan Residential District; campus and students of Xibaipo 2nd Middle School; Two hospitals including Pingshan County Worker's Hospital; 14 administrative office units, business and research agencies including Pingshan County Post Office	Pingshan County Planning Bureau, County Traffic Bureau, County Housing and Urban-Rural Development Bureau, County Broadcasting and TV Office, County Traffic Police Team, Telecom and Gas Companies, County Hospital, etc.	Pingshan County Development and Reform Commission, County Land and Resources Bureau, County Bureau of Civil Affairs, County Labor and Social Security Bureau, County Women's Federation, County Disabled Persons' Federation, etc; Qiaodong Subdistrict Office and Qiaoxi Subdistrict Office, Pingshan Town; Pingshan Urban Heat Supply Co., Ltd.
Xingtai	Residents from 92 places including Yihaihuayuan; campus and students from 8 places including Xingtai Mechanical and Electrical Technical School; 10 hospitals including Xingtai Municipal Zhongshan Hospital; administrative office units, business and research agencies including Xingtai Disease Control Center, and fireman of closed boiler room, etc	Municipal Environmental Protection Bureau, Xingtai County Environmental Protection Bureau, Xingtai Railway Office, Municipal Urban Management Bureau, Municipal Construction Bureau, Municipal Traffic Transportation Bureau, Municipal Traffic Police Team, Xingtai County Traffic Administration Team, Heat Supply Administrative Department, Park Management Committee, Broadcast and TV Administrative Department, Gas Pipe Network Administrative Department; Communication Company, Electricity Company	Xingtai County Government Office, Municipal National Development and Reform Commission, Municipal Urban and Rural Planning Bureau, Municipal Water Supplies Bureau, Municipal Land and Resources Bureau, Municipal Civil Affairs Bureau, Municipal Labor and Social Security Bureau; Municipal Women's Federation, Municipal Disabled Persons' Federation and other organizations; Xingtai Xuyang Anneng Heat Power Co., Ltd.
Zhangjiakou	Residents from 30 places including the No. 251 Hospital's Family Dormitory Building; campus and students from 3 places including Weihua Primary School; various office agencies from 8 places including Qiaodong branch of Land Resources Bureau; fireman of closed boiler room, etc	Municipal Environmental Protection Bureau, Municipal Urban Management Bureau, Municipal Bureau of Public Utilities, Municipal Traffic Bureau, Municipal Engineering Management Office, Municipal Traffic Police Steam; Heat Supply Administrative Department; Broadcast and TV Administrative Department, Gas Pipe Network Administrative Department; Water Supply Company, Municipal Drainage Company, Communication Company, Electricity Company	Qiaodong District Government Office, District Development and Reform Commission, District Environment Protection Bureau, District Labor and Social Security Bureau, District Poverty Relief Office, District Ethnic and Religious Affairs Bureau, District Sanitary Bureau; Zhangjiakou Municipal Development and Reform Commission, Municipal Land and Resources Bureau, Municipal Women's Federation; Zhangjiakou Dongyuan Heat Power Co., Ltd.

Institutions and personnel participated in every activity of the public participation of the project, namely, information disclosure, questionnaire (consultation), consultation meeting, and interview, have included all stakeholders or their representatives.

11.4 Public Participation Activities and Achievements

11.4.1 Chengde subproject

1. Information disclosure

The Chengde Subproject has successively carried out twice project information disclosure. The first project information disclosure place is Lijing Huating community, Yongsheng Modern City community, Yindu Haitang Community, Fuli Park Community, Xiaodonggou Nayingzi Primary School, and other places in the project area; the disclosed documents are mainly posted at the full position such as community entrance or notice board. Meanwhile, the disclosed document is logged in website of the environment assessment unit (Chengde Municipal Environmental Science Research Institute). The first project information disclosure document introduces the basic condition of the project, contact methods of construction unit and environmental assessment unit and available way and method for the public to put forwards opinions. The disclosure period this time is 10 working days as from February 2-13, 2015. The first project information disclosure content shall see **Table 11-4**.

Table 11-4 Chengde Subproject - First Project Information Disclosure Content

Overview of construction project	Project name	World Bank Loan Chengde Concentrated Heat Supply and Energy-saving Reform Project		
	Construction character	New build and rebuild		
	Construction place	Old town of Chengde		
	Construction content and scale	Newly build 4764 m DN400-DN 80 primary heat supply pipe network (length of pipe ditch), 20 towers of regular heat exchange stations, 114 sets of building heat exchange station units, and 246.23×$10^4$$m^2$ heat supply area. Reform 4375 m DN600-DN 80 primary heat supply pipe network (length of pipe ditch), mount 64 sets of DN1000-DN 250 import welding valves, 56792 m DN 300-DN50 and below secondary heat supply pipe network (length of the pipe ditch). Mount pressure differential type flow balance valve on the secondary heat supply pipe network without the heat balance reform; the area of the heat balance reform is 150.09×$10^4$$m^2$, there are 753 sets of DN80-DN32 pressure differential balance valves mounted in total.		
	Total investment	227,318, 700 Yuan		
Construction unit	Unit name	Chengde Heat Power Group Co., Ltd.	Contact number	13031421611
	Communication address	Chengde Heat Power Group Co., Ltd.	Zip code	067000
	Legal person representative	Xin Qiyun	Contact person	Ren Dawei
Assessment unit	Unit name	Chengde Shengyuan Environmental Protection Technology Service Co., Ltd.	Contact person	Dong Xinqiao
	Communication address	No. 18, Cuiqiao Road, Chengde	Contact number	(0314)2109036
	E-mail	hbcdhks@vip.163.com	Website	www.cdhky.cn
Working procedure		1. Entrust Chengde Shengyuan Environmental Protection Technology Service Co., Ltd. to compile a project environmental impact statement; 2. Submit the statement to Chengde Municipal Environmental Protection Agency for approval; 3. Submit the statement to the World Bank for review.		
Main working content for environmental assessment		1. Field investigation, related data collection and analysis; 2. Identification of environmental impact factors, and screening of assessment factor; 3. Determination of assessment grade and assessment scale; 4. Project description; 5. Environmental status investigation and monitoring; 6. Environmental impact prediction and assessment; 7. Demonstration of pollution preventive measures; 8. Public participation investigation; 9. Duty fulfillment investigation; 10. Alternatives analysis; 11. Environment management plan; 12. Assessment conclusion.		
Main matters for asking for the		1. Do you support the project construction? Why?		

public opinions	2. Do you think what environment problems will be brought by the project construction? What is the direct impact on you and your family? 3. What is the greatest concern regarding the pollutants discharged in project construction and operation process? 4. Do you think that the project construction plan is reasonable? 5. Do you believe that the environment impact possibly caused by the project construction can be relieved by taking reasonable measures? 6. What's your opinion or requirement on construction unit if the project is approved to construct?
Main method of providing advises by the public	1) Letter, 2) Visit, 3) Cal,l 4) Online communication, 5) E-mail
Disclosure method of public participation	Website of assessment unit and information notice board

After compiling the first draft of the subproject environmental assessment, the construction unit performs the second project information disclosure; the project information disclosure is still selected at Lijing Huating community, Yongsheng Modern City community, Yindu Haitang Community, Fuli Park Community, Xiaodonggou Nayingzi Primary School, and other places within the project area; the disclosed document is mainly posted at the full position such as community entrance or notice board. Meanwhile, disclosed document is logged on the website of the environmental assessment unit (Chengde Municipal Science Research Institute). The second round information disclosure document introduces the project environmental impact and environmental impact mitigation measures to be adopted, and public's compliant way to related environmental problem of the project (published the address and contact way of the construction unit and the environmental assessment unit). The disclosure period is 10 working days as March 11-24, 2015. The specific information disclosure and its main content shall see **Table 11-5**.

Table 11-5 Chengde Subproject-Second Project Information Disclosure Content

Project name		World Bank Loan Chengde Concentrated Heat Supply and Energy-saving Reform Project
Project overview	Location of Construction	Old town of Chengde City
	Construction unit	Chengde Heat Power Group Co., Ltd.
	Construction scale	227,318, 700 Yuan
	Construction content	Reform 4764 m DN400-DN 80 primary heat supply pipe network (length of pipe ditch), 20 towers of regular heat exchange stations, 114 sets of building heat exchange station units, and $246.23\times10^4 m^2$ heat supply area. Reform 4375 m DN600-DN 80 primary heat supply pipe network (length of pipe ditch), mount 64 sets of DN1000-DN 250 import welding valves, 56792 m DN 300-DN50 and below secondary heat supply pipe network (length of the pipe ditch). Mount pressure differential type flow balance valve on the secondary heat supply pipe network without the heat balance reform; the area of the heat balance reform is $150.09\times10^4 m^2$, there are 753 sets of DN80-DN32 pressure differential balance valves mounted in total.

Countermeasures for preventing or reliving adverse environmental impacts	1. Air environental protection measures: ① Arrange a stable and tidy barrier of which height is not less than 2 meters; height of the barrier at one side of a field border closing to main line and sensitive point direction is not less than 2.5 meters; keep stable and tidy; ② reasonably arrange entrance and harden by concrete; ③ timely transport waste earthwork, not arrange large waste earthwork pile-up yard in the construction site, and keep the pile-up yard far from onside of the sensitive point as much as possible; shield, close or water the materials loaded and moved in the field; ④ perform segmental construction, reasonably arrange the construction schedule and reduce the earth excavation amount within the same time; ⑤ cover a tarpaulin on a transporting vehicle for shipping the dust-contained materials. 2. Water environmental protection measures ① Arrange a special draining channel, and mount a water collecting pond at the channel downstream so that the construction waste water can be recycled after clarifying; do not stack solid construction waste near the water body, and timely clean and transport it; prevent the solid construction waste from scouring to the water body by rainwater; do not arrange construction camp buildings for the construction scale is Chengde urban area, discharge household sewage by using the available public toilet nearby, and do not influence water quality of Wulie River. ② During the structure and pipeline construction, protecting the foundation and trench in excavation, prevent pollutant from penetrating to the underground; recovering the natural stratum structure of the backfill; guaranteeing the project quality of the pipeline construction, keep the heat supply material from any poisonous and harmful matters. 3. Solid waste disposal measure ① Flatten spoil on site, and do not discharge spoil outside; ② Intensively collect the waste generated in pipeline construction and waste welding joint generated in the pipeline welding process, and then uniformly purchase and process the building waste by a waste purchasing station; ③ place household waste of constructors by using the existing waste bin nearby, and intensively clean and transport the waste in the waste bin by Chengde Municipal Environmental Sanitation Department; ④ Transport the building waste generated after removing small boiler room to Chengde Building Waste Landfill to intensively dispose; sell waste boiler device and assistant engine to salvage station; for waste cotton yarn and waste lubricant belong to hazardous waste, submit them to qualified department to dispose especially. Sound environment protection measures ① Reduce noise through an exhaust muffler and an isolating engine vibrating part; prohibit construction at nighttime (22: 00-6: 00 am next day) and lunch time (12: 00 -14: 00); reasonably arrange construction, arrange the machinery device with high noise at one side far from the environmental sensitive point, and carry out certain concrete and protective muffling treatment; set up a temporary isolating barrier at the place closing to the sensitive point direction; do not mount concrete agitator on construction site, and purchase the commercial concrete. ②The heat exchange station adopts soundproof structure in reform, and the heat exchange station is arranged to be a soundproof door; the window is a double-layered closed soundproof window, and water pump inlet and outlet pipelines are equipped with vibration-avoiding throat water pumps, and the foundation adopts vibration reducing measures.
Summaries of environmental impact assessment	The project construction complies with the national and local industry policies; through various pollution preventing and treating measures, pollutants satisfy the standard emission requirement, and have small impact on regional environmental quality. From the environmental protection view, the project is feasible on the basis of strictly executing various pollutant preventing and treating measures of environmental protection “Three Simultaneities”.
Contact method of construction unit	Chengde Heat Power Group Co., Ltd. Contact person: Ren Dawei Contact TEL: 13031421611
Contact method of environmental assessment unit	Chengde Shengyuan Environmental Protection Technology Co., Ltd. Communication address: 18#, Cuiqiao Road, Chengde E-mail: hbcdhks@vip.163.com Website: www.cdhky.cn Contact person: Dong Xinqiao Contact Tel: (0314) 2109830

Main matters for public consultation	Ask for the public's opinions on environmental problems of the project construction, including project location selection, impact of the project on surrounding environments, impact by outside environment possibly after completing the project, environmental protection measures to be taken and other problems concerned and beneficial by the public, so as to improve the environmental protection content of the statement.
Specific form of consultation	Ask for the public's opinion in the form of public participation and questionnaire

2. Questionnaire (Public Consultation)

After the second round information disclosure, the construction unit carries out the sampling questionnaire survey on residential communities involved in project construction and operation area, the surveyed people number is 185, and the surveying method is to release the public consultation tables and recycle after being filled. The public opinion consulting table uses the uniform public opinion consulting table of the project (the specific sample shall see **Table 11-1**). The respondents surveyed are 30-60 years old with the education degree of junior high school and above; the surveyed people have the civil capacity of conduct, and a certain cultural qualification, and can independently fill the public consultation table. The result of the questionnaire shall see **Table 11-6** for details.

Table 11-6 Chengde Subproject- Summary Table of Public Consultation Survey Result

Survey items		**Statistical result**						
Do you know the construction content of the project?	Option	Know well	Know a little	Not clear	Not fill			
	People number	65	82	38				
	%	35.1	44.3	20.5				
What the job that should be done under the current urban heat supply situation by your opinions?	Option	Improve heat source temperature	Improve heat network efficiency	Enlarge heat supply scale	Reform old pipe networks	Not fill		
	People number	96	5	8	76			
	%	51.2	2.7	4.3	42.2			
What is the advantage of intensive heat supply as you think?	Option	Guaranteed heat source	High heat supply temperature	Low heat supply cost	Convenience in maintenance and management	Safe	Environmental protection	Others
	People number	62	59	0	24	14	18	
	%	33.5	31.9	0	13.0	7.4	9.3	
What's your attitude to this project	Option	Support	Oppose	Not care				
	People number	176	0	9				
	%	95.1	0	4.9				
What do you think about the influence of the project construction on the social development?	Option	Good	Bad	Not to matter				
	People number	185	0	0				
	%	100	0	0				
What's influence of the project construction on you and your family?	Option	Good	Bad	No influence				
	People number	162	0	23				
	%	87.6	0	12.4				
What's your benefit possibly impacted by the project construction?	Option	Economy	Life quality	Health status	Others			
	People number	42	90	53				

	%	22.7	48.6	28.6		
Which aspects mainly reflect the environmental impact generated in the construction process of the project?	Option	Air environment	Sound environment	Water environment	Waste slag	Landscape
	People number	42	56	38	45	31
	%	22.7	30.3	20.5	24.3	16.8
Which aspects mainly reflect the good environmental impact after building the project?	Option	Good for air protection	Save energy source			
	People number	73	112			
	%	39.5	60.5			
Are you satisfied with pollution preventing and treating measures to be adopted by the project?	Option	Satisfied	Dissatisfied			
	People number	185	0			
	%	100	0			

The survey result in **Table 11-6** shows:

1) In the problem of "Do you know the construction content of the project?", 35.1% of respondents show that they know the this project very well, and 44.3% of respondents said that they know the project a little; therefore, the most respondents know about the project content more or less. Besides, 20.5% of respondents did not know the project; investigators have introduced the project construction content and possible impact on their living area to the respondents, so as to enhance their understanding degree.

2) Specific to the problem" Do you think what the job that should be done under the current urban heat supply situation?", the respondents think that main work is concentrated at "improve the heat source temperature" and "reform old pipe network".

3) Specific to the problem of advantage of intensive heat supply, most of respondents think that the heat source is guaranteed and the heat supply temperature is high.

4) As for the problem about the attitude of the project, 95.1% of respondents support the project construction, and 9 persons show that they are not concerned.

5) As for the problem of impact of the project on social development, 100% of respondents think that the project is good for social development.

6) As for problem of impact on family, 87.6% of residents think that the project is good for improving the family living quality, and the remaining respondents think that the project construction has no impact on their family life.

7) As for the problem of impact domain of this project, 22.7% of respondents think that it mainly influences the economy, 48.6% of respondents think that it mainly influences the life quality, and 28.6% of respondents think that it influences the health status.

8) Specific to the environmental impact during the construction period, opinion result of the respondents indicates that the concerning degree of the environmental impact in every aspect is the same.

9) Specific to the positive impact of this project, 39.5% of respondents think that the project is good for improving the air environmental quality, and 60.5% of respondents think that the project is good for saving energy source.

10) Specific to the pollution preventing and treating measures of the project, 100% of respondents are satisfied.

By summarizing above survey result, it shows that the project has positive supported by general public. In order to minimize the adverse environmental impact on surrounding resident's life by the project construction, the construction unit shall practically achieve the following points:

(1) Seriously carry out the environmental management requirement and every impact mitigation measure;

(2) According to the proposed plan, feasibly carry out re-employment of boiler workers from closed small boiler room.

3. Consultation meeting and interview

(1) After completing the environmental assessment report outline of the subproject, the construction unit has organized a large-sized public consultation meeting activity; stakeholders participated in the activity include representatives of government management department, related enterprise and resident. On the meeting, the environmental assessment unit introduces the subproject construction condition and possible environmental impacts, and measures to be taken for relieving these impacts. Every representative on site said that they have sufficiently learned about the subproject construction and will support the project construction. They have also put forwards the problems and opinions concerned respectively. The construction unit, design unit and environmental assessment unit have answered these problems, and informed them of information feedback method and way of solving problems. After the consultation meeting, the construction unit, design unit and environmental assessment unit have commonly carried out the first round of subject visit of relevant interest organization, fully communicated with the relevant interest organization in interview and listened to their concerned, and introduced mitigation measures formulated specific to environmental impacts. These relevant interest institutions are satisfied with the mitigation measures formulated specific to the environmental impacts. The details shall see **Table 11-7**.

(2) After completing the first draft of the environmental assessment statement, the construction unit has carried out the second round of subject visit of relevant interest organization, communicated with them in terms of potential environmental impacts of the subproject and measures for reliving these impacts, focused on discussing problems and suggestions proposed by every relevant interest organization in the first round of subject visit, and especially discussed the environmental impact problems concerned by relevant interest unit, and solution measures and schemes. These relevant interest units are satisfied with the related measures for reliving these impacts, and stressed on strengthening management and implementing every measure. In the interview, the information feedback method and way of solving problems are determined. The details shall see **Table 11-7**.

4. Summary of public consultation

The condition and result summary of two rounds of public consulting activities shall see **Table 11-7** for details.

Table 11-7 Chengde Subproject - Summary Table of Situations and Results of Two Rounds of Public Consultation

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
1st Round	From February 2 to February 13, 2015	Lijing Huating Community, Yongsheng Modern City Community, Yingdu Haitang Community, Fuli Garden Community, Xiaotonggou Nanyingzi Primary School, etc.	Local residents and agencies	The 1st project information announcement Content: Introduction to project basic information	/	/
	February 12, 2015	Meeting Room of Chengde Heating Co., Ltd.	Representatives of agencies and residents such as Chengde Environmental Protection Bureau, Chengde Relics Bureau Chengde Housing and Urban-Rural Development Bureau, Chengde Urban Planning Bureau, Niujuanzigou Office, Toudaopailou Office, Xia'erdaohezi Office, Panjiagou Office, Qiaodong Office, Chengde Heating Co., Ltd., Hebei Huare Engineering Design Co., Ltd., and Chengde Shengyuan Environmental Technology Services Co., Ltd.	Public consultation workshop Content: Subproject construction situation and possible environmental impacts, and mitigation measures taken for those impacts. Questions, comments and suggestions proposed by each participant representative were heard; the questions proposed were answered by the IA and EIA agency	The Municipal Environmental Protection Bureau asked questions about the location and alignment layout of the project engineering.	The design institute provided detailed answers by referring to the engineering layout drawing, based on which, the representative of Environmental Protection Bureau expressed that the project construction area would not involve the protection area of water source of Chengde City. The report should be submitted to the Environmental Protection Bureau for approval.
					The Municipal Relics Bureau asked about the engineering alignment, and if there would be engineering construction within the scope of protection of the cultural relic protection agency.	The design institute provided detailed answers. The representative of Relics Bureau expressed that the pipe network alignment and heat exchange station location of this Subproject would not involve the protection area of the cultural relic protection agency and they supported the construction of this Subproject. In the meantime, they hoped that the protection of overall landscape and features of Chengde would be paid attention to during the project construction. And the construction expressed that they would pay attention to construction section by section and point by point, and optimize the construction time during the project implementation, to ensure no impacts on the overall style and features of historical and cultural scenic spots of Chengde.
					The Municipal Bureau of Housing and Urban-Rural	After answered by the construction unit, the representative of the Municipal Bureau of Housing and Urban-Rural

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
					Development asked about the whole process of engineering construction and the compliance of existing planning	Development expressed that the project construction would not conflict with the regulations relevant to construction of Chengde City, and they supported the construction of this Project
					Staff of Chengde Urban Planning Bureau reviewed the project construction drawings and verified relevant urban planning requirements.	After the design institute introduced the engineering content, the representative of Chengde Urban Planning Bureau expressed the construction of this Project would meet the overall planning requirements of Chengde City, and would benefit the implementation of Chengde heat supply planning.
					Niujuanzigou Office, Toudaopailou Office, Xia'erdaohezi Office, Panjiagou Office and Qiaodong Office concerned about the environmental impacts of project construction	After hearing the project construction situation introduction by the design institute and EIA agency, the representatives of street offices and residents had a better understanding of this Subproject and considered that this Subproject would be beneficial to improve the heating efficiency and the area of district heating, and improving the living quality after completion, and generally supported the construction of this Subproject. Regarding the environmental impacts of this Subproject, they considered that there would be no significant impacts on their own life quality during the project construction and operation by taking mitigation measures
	February 15, 2015	Chengde Water Authority	Representatives of agencies such as Chengde Water Authority, Chengde Heating Co., Ltd., Hebei Huare Engineering Design Co., Ltd., and Chengde Shengyuan Environmental Technology Services Co., Ltd.	Special topic interview	Personnel of the Municipal Water Authority verified the engineering construction scope of this Subproject	The Municipal Water Authority considered that the construction of this Subproject would not involve the water source of Chengde Cit. However, as Wulie River is located at low-lying area of downtown of Chengde City, possible pollutants should be avoided from entering the river. In addition, staff of the Water Authority shall be contacted to conduct on-site supervision during the construction on the engineering site relatively near Wulie River
		Chengde Tourism Bureau	Representatives of agencies such as Chengde Tourism	Special topic interview	Leaders of the Municipal Tourism Bureau asked about	The representative of the Municipal Tourism Bureau introduced to the participants about the peak tourist season

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
			Bureau, Hebei Huare Engineering Design Co., Ltd., and Chengde Shengyuan Environmental Technology Services Co., Ltd.		the project construction scope and construction time, etc.	and key tourism sections of Chengde City. After learning about the project construction content, the representative expressed that the normal construction of this Subproject would not cause adverse impacts on the tourist business of Chengde City, but the construction time and road sections should be noted not to hinder tourists from entering and leaving the scenic spots during peak tourist season
		Chengde Traffic Police Branch	Representatives of agencies such as Chengde Traffic Police Branch, Hebei Huare Engineering Design Co., Ltd., and Chengde Shengyuan Environmental Technology Services Co., Ltd.	Special topic interview	Personnel of Chengde Traffic Police Branch learned about the project construction scope and construction operation way	Personnel of the Traffic Police Branch suggested that construction activities should be reasonably organized during the construction, and the adjustment of construction time should be mainly considered so as to reduce the traffic impact.
		Chengde Municipal Group Co., Ltd.	Representatives of agencies such as Chengde Municipal Group Co., Ltd., Hebei Huare Engineering Design Co., Ltd., and Chengde Shengyuan Environmental Technology Services Co., Ltd.	Special topic interview	Personnel of Chengde Municipal Group Co., Ltd. verified the project construction area and pipe network laying method.	The representative of Chengde Municipal Group Co., Ltd. expressed that the design institute of this Subproject should strengthen on-site investigatoin during the design, to make sure no cross influence on relevant municipal pipelines.
	From March 11 to March 24, 2015	Lijing Huating Community, Yongsheng Modern City Community, Yingdu Haitang Community, Fuli Garden Community, Xiaotonggou Nanyingzi Primary School, etc.	Local residents and agencies	The 2nd project information disclosure. Content: Project environmental impacts and proposed mitigation measures for the environmental impacts, and public complaint channel for the environmental problems	/	/
2nd	March 2015	Residential communities	Local residents and agencies	Questionnaire survey	Adverse impacts of the	Mitigation measures for the possible adverse environmental

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
Round		involved during project construction and operation	Sampled number of persons: 185 persons; age: 30-60 years old		subproject construction on the environment and health	impacts has been developed, and will be implemented during the construction and operation
	April 6, 2015	Chengde Water Authority	Representatives of agencies such as Chengde Water Authority, Chengde Heating Co., Ltd., Hebei Huare Engineering Design Co., Ltd., and Chengde Shengyuan Environmental Technology Services Co., Ltd.	Special topic interview	Construction interference problem of water supply pipelines	During the construction, Chengde water supply company will be notified in advance, and staff of the company will be invited to conduct on-site guidance. Measures will be taken during the construction to ensure sewage to be drained into sewers in a small quantity, and not to be discharged externally. Meanwhile, construction waste will be promptly removed and not be piled up near the river.
		Chengde Tourism Bureau	Representatives of agencies such as Chengde Tourism Bureau, Hebei Huare Engineering Design Co., Ltd., and Chengde Shengyuan Environmental Technology Services Co., Ltd.	Special topic interview	The possible tourism impact	Measures to be taken during the construction: Reasonably arrange the construction time to try to avoid peak tourist period such as the week of “Labour Day” and “National Day”, etc.; reduce construction activities or try not to arrange construction along roads in peak tourist season in July and August vacation
		Chengde Traffic Police Branch	Representatives of agencies such as Chengde Traffic Police Branch, Hebei Huare Engineering Design Co., Ltd., and Chengde Shengyuan Environmental Technology Services Co., Ltd.	Special topic interview	The possible traffic impact	The construction activities will not be conducted during traffic rush hour. Furthermore, the construction activities along traffic trunk roads will be arranged in the night as far as possible. Meanwhile, traffic diversion will be set for the construction activities that have to be implemented in the day, to avoid adverse influence on the traffic. The traffic police department will be notified in advance before construction near the traffic trunk roads, and will be cooperated with for completing the traffic organization
		Chengde Municipal Group Co., Ltd.	Representatives of agencies such as Chengde Municipal Group Co., Ltd., Hebei Huare	Special topic interview	The possible pipe network interference problem	Staff of the design institute verified the pipe network situation of relevant sections again to the Municipal Group Co., Ltd., and expressed that they would strengthen the survey in

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
			Engineering Design Co., Ltd., and Chengde Shengyuan Environmental Technology Services Co., Ltd.			design stage to make sure no damage to other relevant pipe networks during the construction

5. Social Assessment Analysis

The public consultation was also implemented for the “social assessment” part of this Subproject, with the following main conclusions:

(1) Promotion of Sustainable Development

The subproject construction improve not only can improve the residents' living environment, raise their life quality and reduce atmospheric pollution, but also can greatly improve the investment environment and promote the local social and economic development.

(2) Most of the Residents Supporting Project Construction

Almost all residents investigated and interviewed strongly supported this Subproject, and they accepted this Subproject to be a livelihood project and able to benefit citizens centrally supplied heat in Shuangqiao District, therefore they generally had high hopes for this Subproject.

(3) Benefiting the Development of Vulnerable Groups

The subproject construction will not adversely affect the vulnerable groups, and the PIU has promised that the price of heating fee will not be increased after project completion, therefore the project implementation will not increase the living cost of the vulnerable groups. In addition, relevant government department is studying and formulating a further support program on the basis of existing heating fee preference for the vulnerable groups, which will be beneficial to further reducing the heating fee payment level of the vulnerable groups.

(4) Ethnic Minorities

There is no area inhabited by ethnic minorities in the subproject implementation scope, thus the project construction will not adversely affect the ethnic minorities.

(5) Increase of Public Participation Awareness

Residents, especially special populations such as the elderly, disabled, residents with the lowest allowance for living and women, showed great participating enthusiasm during the project preparation. It is reasonable to assume that the future public participation awareness will be higher.

6. Summary

As shown by the results of two rounds of public consultation, the subproject impact mitigation measures and solutions for problems concerned have been generally satisfied by stakeholders. About 95% of the public has expressly expressed their support for the project construction and there has been no objection to the project construction, as shown in the results of public consultations.

11.4.2 Pingshan Subproject

1. Information Disclosure

Two round project information disclosures for Pingshan Subproject have been successively conducted. The first round project information disclosure was located at 33 environmental sensitive points such as Kangxin Jiayuan, Vocational Education Center, Pingshan County Workers' Hospital, Pingshan County Administration for Industry and Commerce and Jingye Hotel in the project area; and the disclosure documents were posted on striking positions such as local announcement boards. The document of the first project information disclosure informed the overview and composition of the World Bank loan part in Pingshan County urban central heating energy saving facilities renovation and expansion project, major items planned to be solicited for public comments, major mode of public participation, effective time of public participation, contact information of Pingshan County Urban Heating Co., Ltd. (PIU) and EIA

agency, and ways and means that the public can use for proposing comments. This disclosure lasted for 12 working days from December 8 to 19, 2014.

The IA conducted the second project information disclosure after completion of subproject EIA first draft. This disclosure was still located at the 33 environmental sensitive points such as Kangxin Jiayuan, Vocational Education Center, Pingshan County Workers' Hospital, Pingshan County Administration for Industry and Commerce and Jingye Hotel in the project area; and the disclosure documents were posted on striking positions such as local announcement boards. The document of the second project information disclosure introduced the project environmental impacts and the proposed environmental impact mitigation measures, and the public complaint channel for the environmental problems relevant to this Subproject (addresses and contact information of the PIU and EIA agency were published). This disclosure lasted for 12 working days from January 4 to January 15, 2015.

2. Consultation Meeting

The PIU and EIA agency together visited the residential communities, administrative office units and commercial and research agencies, etc. involved by project construction and operation, and separately held project public comment consultation meeting with the residents and agencies before and after the first project information disclosure (27 Oct to 21 Dec, 2014).

In the meetings, the EIA agency introduced the subproject construction situation and the possible environmental impacts, and mitigation measures taken for those impacts. Each participant representative expressed that they had fully understood the subproject construction and supported the construction; they also proposed own concerned questions and comments. The PIU and EIA agency answered the questions and informed the methods of information feedback and ways to solve problems. See **Table 11-8** for the details of those public consultation meetings.

Table 11-8 Pingshan Subproject - Activity Record of Public Consultation Meetings

Method	Time	Place and Participating Agencies and Personnel	Discussion Content
Small meeting	October 27-28, and December 18-19, 2014	12 resident meetings were held in Zhongshan Community, Yedong Community, Jianshe North Street Community, Dongzhuang Village, Wangzi Village and Nangubi Village, etc., with 156 person-time of participating residents, including 98 person-time of women, 23 person-time of poor persons, and 2 person-time of persons of ethnic minority. Project IA and EIA agency personnel	The possible positive and negative impacts of this Subproject Attitudes and needs of different groups for this Subproject; Situation of heating fee determination and charging method; Questions, comments and suggestions of personnel and agencies participating in the meetings; The EIA agency introduced the project construction situation, the possible environmental impacts and the proposed mitigation measures in those meetings
		3 agency meetings were held, with 16 participating agencies including Pingshan County Civil Affairs Bureau, Human Resources and Social Security Bureau, Housing and Urban-Rural Construction Bureau, Statistics Bureau, Department of Ethnic & Religious Affairs, Women's Federation, Environmental Protection Bureau, Development and Reform Bureau, relevant streets, Pingshan County Heating Company, Ltd. and communities, and 35 person-time in total. Project IA and EIA agency personnel	

3. Household Interview Survey

From the beginning to end of the disclosure of project information for the first time (from October 28 to December 21, 2014), Development Organization and EIA agency made a household interview survey in the residential community which is related to the construction and operation of the project and held meetings with inhabitants and institutions respectively.

The detail information of this household interview survey as follows (**Table 11-9**).

Table 11-9 Pingshan Subproject-Record Table of the Household Interview Survey

Method	Date	Place and institutions, personnel participated	Contents
Household survey	October 28 to 29, 2014 and December 21, 2014	Households in Dongzhuang Village which use earth heating and small coal stove, families in Nanjiabi Village (access to the central heating), families in Jian'an Community (an old community which benefits from the promotion of pipe network), households in Dongjie Community (the reform of heating from series connection to parallel connection is just completed in this district), households in Shanshui Qingcheng Community (the change of heating from series connection to parallel connection is not carried out in this community), households in Yehelijing Community (heat metering charges have been implemented)	Social life of people in the project area; the confirmation of heating fee and situation of charging method; effects of supply of heat from coal stove and earth heating and their effects on the environment; effects of central heating; effects of reform of household heating metering
Interview	October 28 to 29, 2014 and December 20, 2014	There were 54 persons involved in this interview, including employees in small shop and small restaurant on the street, some inhabitants, office-holders in commercial and industrial enterprises and staffs in welfare institution.	Local people's livelihood model and situation of heating in winter; living conditions of local woman, the poor and minority nationality; the impact of project construction; the attitude and requirement of groups which are effected by the project; problems brought from the construction of project which each of them are concerned; views and suggestions on the construction of the project

4. Questionnaire Survey

During October 28 to 29, 2014 and December 20 to 30, 2014, development organization and EIA agency successively organized two questionnaire surveys. Public opinion questionnaires were gave out and recovered after the people filled the tables. The standard public opinion questionnaires were used in this project (see **Table 11-1** for the concrete form). Since population structure and the development of economy and society were different in each community, the respondents were all from people who were affected by this project and people who paid close attention to the construction of this project, and they were all above 20 years old and all own civil act capacity. See **Table 11-10** for the situations of the two questionnaires.

Table 11-10 Pingshan Subproject – Record Table of Household Questionnaire Survey

Number of times	Date	Sources and compositions of respondents	Quantity of questionnaire	Main contents
The first time	October 28 to 29, 2014	There are 135 households involved in this survey, and these household come from three districts which are Zhongshan Community, Yedong Community and Jianshebei Community and three villages in city which are Dongzhuang Village, Wangzi Village and Nanjiabi Village.	135 questionnaires are given out and 130 valid questionnaires are taken back.	Situations of society and economy; situations of housing and heating; willingness to pay and capacity to pay; views and opinions of people invested on the construction of this project.
The second time	December 20 to 30, 2014	The respondents are all come from people who are affected by this project and people who pay close attention to the construction of this project. The total quantity of samples is 60, among which, 40 persons are from 20 to 60 years old; 24 persons are female; 18 persons have educational	60questionnaires are given out and 52 valid questionnaires are taken back.	The impact of project construction; views and suggestions on the construction of the project

		background which is junior high school or above that and 60 persons are farmers.		

Contents of the first questionnaire laid particular stress on the natural situation, attitude of central heating, willingness to pay and the preliminary views on the construction of Pingshan Subproject from the respondents. The contents of the second questionnaire where 52 valid questionnaires were taken back lay particular stress on the views and opinions of the environmental effect from the construction of Pingshan Subproject. See **Table 11-11** for the detailed statistical results of the second questionnaire survey.

Table 11-11 Pingshan Subproject – Summary Table of Public Consultation Questionnaire Results

Survey items		Results (Percentage of total survey)	
How do you know this project will be constructed?	1. Broadcast	0	0
	2. Newspaper	0	0
	3. Network	3	5.8%
	4. TV	18	34.6%
	5. others	31	59.6%
After the implementation of this project, whether it is good for the local (urban area) heating conditions and economic development?	1. Improve the living heating condition	33	63.5%
	2. Favor the exploitation and utilization of land in the pipe network coverage area	0	0
	3. Improve the development of urban economy	19	36.5%
	4. Few effects	0	0
	5. Unclear	0	0
Are you satisfied with the current heating conditions in the residential area?	1. Very satisfied	28	53.8%
	2. Satisfied	24	46.2%
	3. Comparatively satisfied	0	0
	4. Unsatisfied	0	0
Which of the following issues is the main environmental issue in this area now?	1. Noise	8	15.4%
	2. Dust	7	13.5%
	3. Sewage	2	3.8%
	4. Air pollution	34	65.4%
	5. Others	0	0
Which of the following effects is the main environmental effect in the construction period of this project?	1. Noise	4	7.7%
	2. Dust	8	15.4%
	3. Sewage and mud	4	7.7%
	4. The traffic jam	33	63.4%
	5. others	1	1.9%
What's your attitude and requirement of the environmental protection measures to be taken in the construction period?	1. Approval and satisfaction	52	100%
	2. Still need to be strengthened and improved	0	0
	3. Careless	0	0
What's your attitude of this project?	1. Support	52	100%
	2. Conditional support	0	0
	3. Nonsupport	0	0

The survey results in **Table 11-11** showed as follows:

1) 59.6 percent of respondents get to know this project is about to be constructed with non – traditional media; 34.6 percent of respondents know this project is about to be taken on TV.

2) 63.5 percent of respondents think that it is good for the improvement of the local heating condition after the implementation of this project, and 36.5 percent of respondents think it is good for the development of the urban economy after the implementation of this project.

3) 53.8 percent of respondents are very satisfied with the current heating condition in the residential area, and 46.2 percent of respondents are satisfied with the current heating condition in the residential area.

4) 15.4 percent of respondents think the main current environmental problem in this area is noise, and 13.5 percent of respondents consider it is dust that affects the current environment, but 65.4 percent of respondents believe that the air pollution is the main environmental issue.

5) For the main environmental effect in the construction period of this project, 63.4 percent of respondents think the effect is traffic jam, and 15.4 percent of them consider the effect is dust, but 7.7 percent of them believe that it is noise that affects the environment.

6) 100 percent of respondents approve and are satisfied with the environmental protection measures to be taken in the construction period.

7) 100 percent of respondents support the construction of this project.

The survey results above showed a high degree of public approval for this project. In order to reduce the adverse environmental effects on the life of surrounding residents from this project, the construction unit should earnestly implement the measures to satisfy the requirement of the environmental management and reduce each effect.

5. Special Subject Consultancy Conference

After the disclosure of the Environmental Impact Report (draft), the construction unit does not get feedback and suggestion from the surrounding residents, but electric power corporation, mobile communications corporation and other institutions inform suggestions about measures to be implemented during the construction to avoid the damage of pipe line of electric power and telecommunication cable.

Thus, on April 10, 2015, a conference for a special subject was held in heating office in Pingshan County by the Government of Pingshan County to discuss the problems which were to happen and the solutions during the construction period of this project. The meeting was presided over by associate director of government office in Pingshan County, and units attended the meeting include County Roads and Traffic Authority, Urban Management Bureau, Construction Bureau, Environmental Protection Agency, Telecommunication Office, Planning Bureau, Health Bureau, Traffic Police Team, Water Supply Office, Heating Office, Municipal Corporation, electric power companies, natural gas companies, mobile communication companies, construction units and EIA agency. Road and Traffic Authority, Electric power companies, Mobile Communication companies and Water Supply Office proposed suggestions in written form which is about the effects on the pipe network and road transport in the process of construction.

After the meeting, the construction unit and EIA agency studied the suggestions proposed by Road and Traffic Authority, electric power companies, mobile communication companies and Water Supply Office and raised solutions and measures to reduce the effects, which were implemented in the chapter about measures to reduce effects on the environment in the EIA report. The written form of these solutions were sent to Road and Traffic Authority, Electric power companies, mobile communication companies and Water Supply Office and other

related units on April 15th to 16th, 2015, and all these units were satisfied with the measures implemented to reduce the effects.

6. Summary of Public Consultation

See **Table 11-12** for the summary of situations and results of two public consultation activities.

Table 11-12 Pingshan Subproject – Summary Table of Two Rounds of Public Consultation

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
1st Round	October 28 to 29, 2014	Three districts which are Zhongshan Community, Yedong Community and Jianshebei Community and three villages in city which are Dongzhuang Village, Wangzi Village and Nanjiabi Village.	There are 135 households involved in this survey and these household come from three districts which are Zhongshan Community, Yedong Community and Jianshebei Community and three villages in city which are Dongzhuang Village, Wangzi Village and Nanjiabi Village.	The first questionnaire survey	The basic situation of the construction of subproject	/
	October 27 to 28, 2014 and December 18 to 19, 2014	Zhongshan Community, Yedong Community, Jianshebei Community, Dongzhuang Village, Wangzi Village, Nanjiabi Village and other places	Residents in Zhongshan community, Yedong community, Jianshebei community, Dongzhuang Village, Wangzi Village, Nanjiabi Village and other places; staff in construction unit and EIA institute.	12 small workshops Contents: Introduction to the basic situation of this project.	The possible positive and negative impacts of this Subproject; confirmation of heating fee and the way to charge	The EIA institute introduced the situation of the project construction, the possible environmental effects, and the solutions to reduce the effects. The construction unit explained the heating fee and way to charge.
		Heating Office in Pingshan County	16 agencies including Pingshan County Civil Service Bureau, Human Resource and Social Security Bureau, Construction Bureau, Statistics Bureau, National Bureau of Religious Affairs, the Womens Federation, Environmental Protection Bureau, Development and Reform Commission, the subdistrict offices, Thermal Co., Ltd. in the town of Pingshan County; staff of construction unit and EIA institute.	3 small workshops Contents: the introduction of the basic situation of this project.	The possible positive and negative impacts of this Subproject	EIA insititute introduced the situation of the project construction, the possible environmental effects, and the solutions to reduce the effects.

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
	October 28 to 29, and December 21, 2014	Each relevant heating household	Households in Dongzhuang Village which use earth heating and small coal stove, families in Nanjiabi Village (access to central heating), families in Jian'an Community (an old district which benefits from the promotion of pipe network), families in Dongjie Community (the change of heating from series connection to parallel connection is just completed in this district), families in Shanshui Qingcheng Community (the change of heating from series connection to parallel connection is not carried out in this district), families in Yehelijing Community (heat metering charges have been implemented)	Household survey Contents: the social life of people in the project area; the confirmation of heating fee and situation of way to charge	Issues which the Urban Heating Co., Ltd concerns: effects of heat supply from coal stove and earth heating and their effects on the environment; effects of district heating; effects of reform of household heating metering	Solutions to solve the problems with the construction of subproject. Measures to reduce the effects or avoid the environmental problems.
	October 28 to 29, and December 20, 2014	Each consultation place in Pingshan County	There were 54 persons involved in this interview, including employees in small shop and small restaurant on the street, some inhabitants, office-holders in commercial and industrial enterprises and staffs in welfare institution.	Interview Content: The attitude and requirement of people who are affected by this project; Local people's livelihood model and situation of heating in winter; living conditions of local woman, the poor and minority	Issues which the Urban Heating Co., Ltd concerns: the possible effects which people suffered from the project construction; views and suggestions of groups affected by the project.	Solutions to solve the problems with the construction of subproject. Measures to reduce the effects or avoid the environmental problems.

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
				nationality;		
	December 8 to 19, 2014	33 places including Kangxin Jiayuan, Vocational Education Center, Pingshan County Workers' Hospital, Pingshan County Administration for Industry and Commerce, Jingye Hotel and so on	The local residents and institutions	The first project information disclosure. Contents: introduction to the basic information of the project	/	/
2nd Round	December 20 to 30, 2014	The town of Pingshan County	People affected by or paying close attention to the project in the construction area of county project.	The second questionnaire survey	Adverse effect on the environment and health from subproject	Measures have been made to reduce the adverse environmental effect, and these measures will be implemented in the construction and operation period.

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
	January 4 to 15, 2015	33 places including Kangxin Jiayuan, Vocational Education Center, Pingshan County Workers' Hospital, Pingshan County Administration for Industry and Commerce, Jingye Hotel and so on	The local residents and institutions	The second project information disclosure. Contents: the environmental effects of this project, the solutions to reduce these environmental effects and channels to complain the environmental issues for the public.	/	/
	April 10, 2015	Heating Office in Pingshan County	Pingshan County Government Office, County Roads and Traffic Authority, Urban Management Bureau, Construction Bureau, Environmental Protection Bureau, Telecommunication Office, Planning Bureau, Health Bureau, Traffic Police Team, Water Supply Office, Heating Office, Municipal Corporation, electric power companies, natural gas companies, mobile communication companies, construction units and EIA institute	Specific Consultation Workshop	The Roads and Traffic Authority concerned the effects on the road transport during project construction.	1) Before the commencement of construction, construction unit should communicate with the administrative department of the local traffic to make traffic arrangements including adjustment of vehicle travelling routing, arrangement of time interval, and vehicle restriction rules. These arrangements should be informed to the society ahead of time by using televisions, radios, newspapers and other means; 2) For the main roads and crossings, designated persons from

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
						construction unit are designated to assist the traffic control to make the traffic unimpeded and orderly in rush hour; 3) The on-site survey should be strengthened and the reasonable construction plan should be made to cross the road in the planning phrase. 4) The construction unit should contact with the Municipal Division of Highway Management to ensure the safety before the commencement of construction.
					Electric power companies, mobile communication companies and Water Supply Office are concerned with the effects on the pipe network in the process of construction.	Before the commencement of construction, the construction unit of pipe network should know the direction and layout of the original pipe networks for water supply and drainage, electric power, gas and communication in the construction area and strengthen the communication with these departments (enterprises) to avoid damage and interference by the project construction.

7. Summary

According to the two rounds of public participated activities in Pingshan County, a majority of the public and institutions agreed the energy conservation transformation of central heating in the urban area of Pingshan County and the expansion of construction object, and they agreed with the site selection of this project and are satisfied with the measures to protect the environment. The engineering construction was considered to effectively solve the problem of heating in the urban area of Pingshan County, improve the quality of life for the residents as well as improve the development of regional society and economy. The stakeholders and the public were concerned with the problems of environmental effects such as noise, dust, traffic in the process of construction, and they expected these problems can be solved appropriately, so the construction unit took fully account of the concern and made measures to reduce and solve the effects which satisfy the stakeholders. All in all, the results of the two public consultation activities showed that about 100 percent of the public clearly support the construction of this project construction without an objection.

11.4.3 Xingtai Subproject

1. Information Disclosure

A. The 1st disclosure of project information

There were two disclosures of project information successively carried out for Xingtai Subproject. The 1st disclosure was held after the work outline of EIA are completed in the communities, schools, hospitals and other sensitive places along the pipe network of this project, and the documents were posted on the exits and entrances, bulletin boards as well as other places which can attract people's attention. The public information included the general situation of the project, name of development organization, name and contact way of the EIA agency, the working program of environmental impact review and the main job content, the main items of asking for the public suggestions and the main way to proposing suggestions for the public. The information disclosures lasted for 12 and 15 weekdays respectively which are February 5, 2015 – February 17, 2015, March 17, 2015 – March 30, 2015, March 27, 2015 – April 10, 2015 and April 14, 2015 – April 25, 2015. There is no feedback for the development organization or the EIA agency. The first disclosure of project information is shown in **Table 11-13**.

Table 11-13-1 Xingtai Subproject-the 1st Information Disclosure Content (Phase II Project)

Environmental Impact Assessment of the World Bank Funded Project of the Centralized Heating Provided by the Industrial Heat Waste in Xingtai
The 1st Information Disclosure

According to documentation requirements of *Environmental Impact Assessment Law of the People's Republic of China*, the *Temporary Act of Environmental Impact Assessment of Public Participating* (HF[2006] No.28) and the *Disclosure on Further Strengthening the Construction Project of Public Participation Work in Environmental Impact Assessment* (JHBF [2010] No.238), the relevant issues about the "World Bank funded project of the centralized heating provided by the industrial heat waste in Xingtai" are as follows:

I. Project name and overview

Project name: Environmental Impact Assessment of the World Bank Funded Project of the Centralized Heating Provided by the Industrial Heat Waste in Xingtai

Construction unit: Xingtai Xuyang Anneng Heating Co, Ltd.

Construction type: new construction

Construction site: West of Shixiang village of the Yanjiatun town in Xingtai County of Xingtai

Construction content and scale: a) heat engineering: Build 2 heat-pump rooms in the origin station of heat supply (install 17 absorption heat pump) to transfer heat of the waste heat resources in the Xuyang coal plant areas. b) Pipeline engineering: build heat pipeline networks 1900 meters (from dry quenching waste-heat boiler of Hebei Xuyang coal coking Co, Ltd to the origin station of heat supply), steam pipe networks 2000 meters (from the plant of Hebei Xuyang coal coking Co, Ltd to the origin station of heat supply), condensation water pipe networks 2000 meters (from the plant of Hebei Xuyang Coal Coking Co, Ltd. to the origin station of heat supply), heating pipe networks 34.445 km, 193 conventional heating stations, 14 building heating stations. c) Effects of implementation: When the construction is completed, the area covered by centralized heat covers 8738.1 thousand square meters and the maximum heating load reaches 314.57 MW. The project can recycle the waste heat of Xuyang coal industry to replace gas boiler rooms in the

community, ground-source heat pumps, central air-conditioners and so on, which can save electric energy, natural gas resources and reduce environmental pollution. Thus the achievement of centralized heating of northwestern regions in Xingtai can improve the life quality of residents.

II. Construction unit name and contact information

Construction unit: Xingtai Xuyang Anneng Heating Co, Ltd.

Contact address: West of Shixiang village of the Yanjiatun Town in Xingtai County of Xingtai of Hebei Province

Contact: Yang Xinpo Contact number: 0319-3939618 email: yangxp@risun.com

III. Name of unit of EIA and contact information

Assessment unit: All Joint Energy Environmental Protection Technology Co., Ltd.

Contact address: No.167 Yuejin Road , Shijiazhuang, Hebei Province Zip code: 050031

Contact: Wei Haiping, Zhang Dandan Contact number: 0311-85082895

Fax: 0311-85616978 Email: nhshbs@263.net

IV. Work procedures of environmental impact assessment and main works

Work procedures of assessment: entrustment by the construction unit—information disclosure—file and technique data research—survey on present environmental condition—project engineering analysis—environmental impact assessment—information disclosure and public advisement—environmental effects report compilation—approval report

Main work contents: make an survey on present condition and assessment of atmospheric environment, water environment, sound environment, social environment and ecological environment within the project assessment range. Predict and assess the effects upon the surrounding natural environment, social and economic environment of the exhaust gas, waste water, noise, solid waste and construction occupation of land during the construction and waste water, noise and solid waste during the operation period. Also put forward preventions towards the factors, characteristics and degree of impacts upon environment and put forward countermeasures to reduce the adverse environmental impacts, which will provide a scientific basis for feasible, effective measures towards environmental protection during the construction and operation period and the strengthening of environmental management to promote the coordinated development of economic construction and environmental protection. What is more, make a demonstration of environmental feasibility of the engineering construction under the precondition of having taken anti-pollution measures.

V. Main issues for soliciting public opinions

The disclosure is mainly used to solicit public opinions towards the involved environmental problems of the project, including site and route selection, effects of the project upon the surrounding environment, anti-pollution measures that should be taken and other interesting, concerning problems of public, to know about opinions and suggestions of public towards the project, accept the public supervision, improve and perfect the anti-pollution measures.

VI. Major ways of making public opinions

Individuals or institutions can submit written comments to construction units and environmental impact assessment units through letters, faxes, emails and other ways (please provide detailed contact information as far as possible when voicing your opinions)

Units of environmental impact assessment will keep a true record of public opinions and suggestions in the environmental impact assessment reports and reflect the valuable opinions and advice to construction units and relevant departments.

VII. Start/stop time of disclosure

Start-stop time of disclosure: From February 5, 2015 to February 17, 2015. The disclosure lasts for 10 workdays.

Table 11-13-2 Xingtai Subproject-the 1st Information Disclosure Content (the Whole Project)

Environmental Impact Assessment of the World Bank Funded Project of the Centralized Heating Provided by the Industrial Heat Waste in Xingtai

The 1st Information Disclosure

According to documentation requirements of Environmental Impact Assessment Law of the People's Republic of China, the Temporary Act of Environmental Impact Assessment of Public Participating (HF[2006] No.28) and the Disclosure on Further Strengthening the Construction Project of Public Participation Work in Environmental Impact Assessment (JHBF [2010] No.238), the relevant issues about the "World Bank funded project of the centralized heating provided by the industrial heat waste in Xingtai" are as follows:

I. Project name and overview

Project name: Environmental Impact Assessment of the World Bank Funded Project of the Centralized Heating Provided by the Industrial Heat Waste in Xingtai

Construction unit: Xingtai Xuyang Anneng Heating Co, Ltd.

Construction type: new construction

Construction site: West of Shixiang village of the Yanjiatun town in Xingtai County of Xingtai

Construction content and scale: a) heat engineering: Build heat-pump rooms in the origin station of heat supply to transfer heat of the waste heat resources in the Xuyang coal plant area. b) pipeline engineering: build heat pipeline networks 11,600 meters (from dry quenching waste-heat boiler of Hebei Xuyang coal coking Co, Ltd to the origin station of heat supply), steam pipe networks 2,000 meters (from the plant of Hebei Xuyang coal coking Co, Ltd to the origin station of heat supply), condensation water pipe networks 2,000 meters (from the plant of Hebei Xuyang Coal Coking Co, Ltd. to the origin station of heat supply), heating pipe networks 37.498 km, 1 booster pump station, 214 conventional heating stations, 14 building heating stations. c) Effects of implementation: When the construction is completed, the area covered by centralized heat covers 9949.6 thousand square meters and the maximum heating load reaches 383.85 MW. The project can recycle the waste heat of Xuyang coal industry to replace gas boiler rooms in the

community, ground-source heat pumps, central air-conditioners and so on, which can save electric energy, natural gas resources and reduce environmental pollution. Thus the achievement of centralized heating of northwestern regions in Xingtai can improve the life quality of residents.

II. Construction unit name and contact information

Construction unit: Xingtai Xuyang Anneng Heating Co, Ltd.

Contact address: West of Shixiang village of the Yanjiatun Town in Xingtai County of Xingtai of Hebei Province

Contact: Yang Xinpo Contact number: 0319-3939618 Email: yangxp@risun.com

III. Name of unit of EIA and contact information

Assessment unit: All Joint Energy Environmental Protection Technology co., LTD.

Contact address: No.167 Yuejin Road , Shijiazhuang, Hebei Province Zip code: 050031

Contact: Wei Haiping, Zhang Dandan Contact number: 0311-85082895

Fax: 0311-85616978 Email: nhshbs@263.net

IV. Work procedures of environmental impact assessment and main works

Work procedures of assessment: Entrustment of the construction unit—information disclosure—file and technique data research—survey on present environmental condition—project engineering analysis—environmental impact assessment—information disclosure and public advisement—environmental effects report compilation—approval report

Main work contents: Make an survey on present condition and assessment of atmospheric environment, water environment, sound environment, social environment and ecological environment within the project assessment range. Predict and assess the effects upon the surrounding natural environment, social and economic environment of the exhaust gas, waste water, noise, solid waste and construction occupation of land during the construction and waste water, noise and solid waste during the operation period. Also put forward preventions towards the factors, characteristics and degree of impacts of environment and put forward countermeasures to reduce the adverse environmental impacts, which will provide a scientific basis for feasible, effective measures towards environmental protection during the construction and operation period and the strengthening of environmental management to promote the coordinated development of economic construction and environmental protection. What is more, make a demonstration of environmental feasibility of the engineering construction under the precondition of having taken anti-pollution measures.

V. Main issues for soliciting public opinions

The disclosure is mainly used to solicit public opinions towards the involved environmental problems of the project, including site and route selection, effects of the project upon the surrounding environment, anti-pollution measures that should be taken and other interesting, concerning problems of public, to know about opinions and suggestions of public towards the project, accept the public supervision, improve and perfect the anti-pollution measures.

VI. Major ways of making public opinions

Individuals or institutions can submit written comments to construction units and environmental impact assessment units through letters, faxes, emails and other ways (please provide detailed contact information as far as possible when voicing your opinions)

Environmental impact assessment units will keep a true record of public opinions and suggestions in the environmental impact assessment reports and reflect the valuable opinions and advice to construction units and relevant departments.

VII. Start/stop time of disclosure

Start-stop time of disclosure: From April 14, 2015 to April 25, 2015. The disclosure lasts for 10 workdays.

B. The 2nd Project Information Disclosure

The 2nd project information disclosure was conducted when the first draft of the environmental effects statements is completed. The disclosure was publicly displayed at sensitive spots like communities along the pipeline networks, schools and hospitals. The disclosure files were mainly put up on visible corners like the entrances, exits of communities or bulletin boards. The disclosure information covered the project overviews, possible impacts of the project construction upon the environment, countermeasures of prevention or alleviation from adverse environmental impacts, key points of conclusions of the environmental impact assessment, construction units names and contact information, main issues for soliciting public opinions and main methods with which the public put forward opinions. The disclosure time was from March 17, 2015 to March 30, 2015, from March 27, 2015 to April 10, 2015 and from May 4, 2015 to May 15, 2015. It lasts for 10 workdays totally. During the disclosure period, nobody gave feedbacks to the construction units and assessment units. The first information disclosure contents of the project are listed in **Table 11-14**.

Table 11-14-1 Xingtai Subproject-The 2nd Information Disclosure (Phase II project)

Environmental Impact Assessment of the World Bank Funded Project of the Centralized Heating Provided by the Industrial Heat Waste in Xingtai

The 2nd Information Disclosure

According to the *Temporary Act of Environmental Impact Assessment of Public Participating* enacted by the State Environmental Protection

Administration in 2006, the relevant issues about environmental impact assessment of the 'World Bank funded project of the centralized heating provided by the industrial heat waste in Xingtai' are in the followings:

I. Overview of construction project

Project name: Environmental Impact Assessment of the World Bank Funded Project of the Centralized Heating Provided by the Industrial Heat Waste in Xingtai

Construction unit: Xingtai Xuyang Anneng Heating Co, Ltd.

Construction type: new construction Construction site: West of Shixiang village of the Yanjiatun Town in Xingtai County of Xingtai

Construction content and scale: a) Heat engineering: build 2 heat-pump rooms in the origin station of heat supply (install 17 absorption heat pumps) to transfer heat of the waste heat resources in the Xuyang coal plant area. b) Pipeline engineering: build heat pipeline networks 1,900 meters (from dry quenching waste-heat boiler of Hebei Xuyang coal coking Co, Ltd to the origin station of heat supply), steam pipe networks 2,000 meters (from the plant of Hebei Xuyang coal coking Co, Ltd to the origin station of heat supply), condensation water pipe networks 2,000 meters (from the plant of Hebei Xuyang coal coking Co, Ltd to the origin station of heat supply), heating pipe networks 34.445 km, 193 conventional heating stations, 14 building heating stations. c) Effects of implementation: when the construction is completed, the area covered by centralized heat covers 8738.1 thousand square meters and the maximum heating load reaches 314.57 MW. The project can recycle the waste heat of Xuyang coal industry to replace gas boiler rooms in the community, ground-source heat pumps, central air-conditioners and so on, which can save electric energy, natural gas resources and reduce environmental pollution. Thus the achievement of centralized heating of northwestern regions in Xingtai can improve the life quality of residents.

II. Possible impacts of the project on the environment

Construction period

1) Exhaust gas: dusts caused by the civil construction, secondary dusts caused by the vehicle transports and so on 2) Waste water: the household wastewater of constructors and construction wastewater. 3) Noise: construction machinery noise and traffic noise of transport vehicles 4) Solid waste: construction waste like construction spoil, concrete blocks and household waste of constructors and so on.

Operation period

1) Wastewater: wastewater of dirt separators and of soft water preparation, household wastewater and so on. 2) Noise: the noise of heat source water circulating pump, heat pump, condensate pump and so on. 3) Solid waste: household waste.

III. Countermeasures of prevention or alleviation from adverse environmental impacts

Construction period

1) Ambient air: water the construction site regularly, covers the piled supplies, set up dam-boards at the border of the construction; cover the transport vehicles with mantas to control the dusts during the construction period. 2) Water environment: build drains, collecting tanks, grit basins and other water treatment structures on the construction site; collect the wastewater separately; reuse the water when it reaches the standard through grit basins and never discharge the wastewater; adopt anti-seepage latrine pits and set no bath facilities within the construction site; use the small amount of waste washing water for dust suppression and watering; pipeline construction sites rely on the surrounding living facilities and household wastewater is discharged into the sewage treatment plants through the municipal pipe networks. 3) Sound environment: adopt low-noise equipments and arrange the construction time reasonably; transporting vehicles choose the routes on which there are fewer residential area on both sides of the road; vehicles should slow down near residential areas and no honking. 4) Solid waste: spoils should be used to backfill the pile ditches; household waste of constructors should be handled uniformly by sanitation departments and other construction waste should be transported to appointed sites of urban-management departments.

Operation period

1) Water environment: during the heating period, the recoiled wastewater of dirt separators of the first stop and household wastewater treated by the three-chamber septic tanks should be discharged into phenol cyanogen wastewater treatment station of Xuyang coal plants; wastewater of first network soft water preparation and of second network soft water preparation in the heating station and household wastewater treated by the residential septic tanks should be discharged to sewage treatment plants in Xingtai through the municipal sewage pipe networks. During the non-heating period, wastewater is mainly the household wastewater of the origin station of heat supply and should be discharged to phenol cyanogen wastewater treatment station of Xuyang coal plants after being treated by the three-chamber septic tanks. 2) Sound environment: set up the noise-facilities in plants and take other sound insulation and noise reducing measures to control the adverse effects of equipments-operation noises upon the surrounding sound environment. 3) Solid waste: household waste should be transported to appointed sites of sanitation departments to be dealt.

IV. Key points of EIA conclusions

The project construction conforms to the current national industrial policy requirements and helps to improve the current situation of heat supply. Thus if anti-pollution measures in the reports are strictly carried out and the 'Three Simultaneities' system is strictly implemented, the construction and post-construction will have obvious effects upon the surrounding environment. From the perspective of anti-pollution, the project construction is feasible.

V. Main contents of the abridged edition of environmental impacts reports

Project overview: the current situation introduction of the natural, social environment and environmental quality of the construction site; engineering analysis, primary pollution sources of the project construction, the countermeasures taken and the treatment effects; predictions of possible effects upon the environment, measures of preventions or alleviations from the adverse effects upon the environment; conformity of project industrial policies and so on.

VI. Ways and the time limit of looking up the abridged edition of environmental impacts reports

The public may look up the abridged edition of environmental impacts reports through village committees, schools or hospital offices. The time limit is from March 17, 2015 to March 30, 2015. And it lasts for 10 workdays totally.

VII. Ways and the time limit for the supplementary information

The public can ask for the supplementary information from the construction units or the environmental assessment units through telephones, letters, faxes or emails. The time limit is from March 17, 2015 to March 30, 2015. And it lasts for 10 workdays totally.

VIII. Main contents for soliciting public opinions

Main issues for soliciting public opinions include public opinions towards the relevant environmental problems of the project construction. Include: whether the selected construction site is accepted or not? The effects of the project construction upon the surrounding environment, further anti-pollution measures and some other concerning public problems. The public can give opinions in written forms through emails, letters, faxes and other ways to give feedbacks to construction units or environmental assessment units. Please provide detailed contact information when voicing opinions for our convenience to give feedbacks of relevant information to you in time.

IX. Construction unit and contact information

Construction unit: Xingtai Xuyang Anneng Heating Co, Ltd.

Address: West of Shixiang village of the Yanjiatun Town in Xingtai County of Xingtai Email: yangxp@risun.com

Contact: Yang Xinpo Tel: 0319-3939618

X. EIA agency and contact information

All Joint Energy Environmental Protection Technology Co., Ltd.

Address: No.167, Yuejin Road, Shijiazhuang City, Hebei Province

Zip code: 050031 Contact: Wei Haiping, Zhang Dandan Tel: 0311-85082895

Fax: 0311-85616978 Email: nhshbs@263.net

Table 11-14-2 Xingtai Subproject-The 2nd Information Disclosure (the Whole Project)

Environmental Impact Assessment of the World Bank Funded Project of the Centralized Heating Provided by the Industrial Heat Waste in Xingtai

The 2nd Information Disclosure

According to the *Temporary Act of Environmental Impact Assessment of Public Participating* enacted by the state environmental protection administration in 2006, the relevant issues about environmental impact assessment of the 'World Bank funded project of the centralized heating provided by the industrial heat waste in Xingtai' are in the followings:

I. Overview of construction project

Project name: Environmental Impact Assessment of the World Bank Funded Project of the Centralized Heating Provided by the Industrial Heat Waste in Xingtai

Construction unit: Xingtai Xuyang Anneng Heating Co, Ltd.

Construction type: new construction Construction site: West of Shixiang village of the Yanjiatun Town in Xingtai County of Xingtai

Construction content and scale: a) Heat engineering: build heat-pump rooms in the origin station of heat supply to transfer heat of the waste heat resources in the Xuyang coal plant area. b) Pipeline engineering: build heat pipeline networks 11,600 meters (from dry quenching waste-heat boiler of Hebei Xuyang coal coking Co, Ltd to the origin station of heat supply), steam pipe networks 2,000 meters (from the plant of Hebei Xuyang Coal Coking Co, Ltd. to the origin station of heat supply), condensation water pipe networks 2,000 meters (from the plant of Hebei Xuyang Coal Coking Co, Ltd. to the origin station of heat supply), heating pipe networks 37.498 km, 1 booster pump station, 214 conventional heating stations, 14 building heating stations. c) Effects of implementation: when the construction is completed, the area covered by centralized heat covers 9949.6 thousand square meters and the maximum heating load reaches 383.85 MW. The project can recycle the waste heat of Xuyang coal industry to replace gas boiler rooms in the community, ground-source heat pumps, central air-conditioners and so on, which can save electric energy, natural gas resources and reduce environmental pollution. Thus the achievement of centralized heating of northwestern regions in Xingtai can improve the life quality of residents.

II. Possible impacts of the project on the environment

Construction period

1) Exhaust gas: dusts caused by the civil construction, secondary dusts caused by the vehicle transports and so on 2) Waste water: the household wastewater of constructors and construction wastewater. 3) Noise: construction machinery noise and traffic noise of transport vehicles 4) Solid waste: construction waste like construction spoil, concrete blocks and household waste of constructors and so on.

Operation period

1) Wastewater: wastewater of dirt separators and of soft water preparation, household wastewater and so on. 2) Noise: the noise of heat source water circulating pump, heat pump, condensate pump and so on. 3) Solid waste: household waste.

III. Countermeasures of prevention or alleviation from adverse environmental impacts

Construction period:

1) Ambient air: water the construction site regularly, covers the piled supplies, set up dam-boards at the border of the construction, cover the transport vehicles with mantas to control the dusts during the construction period. 2) Water environment: build drains, collecting tanks, grit basins and other water treatment structures on the construction site; collect the wastewater separately; reuse the water when it reaches the standard through grit basins and never discharge the wastewater; adopt anti-seepage latrine pits and set no bath facilities within the construction site; use the small amount of waste washing water for dust suppression and watering; pipeline construction sites rely on the surrounding living facilities and household wastewater is discharged into the sewage treatment plants through the municipal pipe networks. 3) Sound environment: adopt low-noise equipments and arrange the construction time reasonably; transporting vehicles choose the routes on which there are fewer

residential area on both sides of the road; vehicles should slow down near residential areas and no honking. 4) Solid waste: spoils should be used to backfill the pile ditches; household waste of constructors should be handled uniformly by sanitation departments and other construction waste should be transported to appointed sites of urban-management departments.

Operation period

1) Water environment: during the heating period, the recoiled wastewater of dirt separators of the first stop and household wastewater treated by the three-chamber septic tanks should be discharged into phenol cyanogen wastewater treatment station of Xuyang coal plants; wastewater of first network soft water preparation and of second network soft water preparation in the heating station and household wastewater treated by the residential septic tanks should be discharged to sewage treatment plants in Xingtai through the municipal sewage pipe networks. During the non-heating period, wastewater is mainly the household wastewater of the origin station of heat supply and should be discharged to phenol cyanogen wastewater treatment station of Xuyang coal plants after being treated by the three-chamber septic tanks. 2) Sound environment: set up the noise-facilities in plants and take other sound insulation and noise reducing measures to control the adverse effects of equipments-operation noises upon the surrounding sound environment. 3) Solid waste: household waste should be transported to appointed sites of sanitation departments to be dealt.

IV. Key points of environmental impact assessment conclusions

The project construction conforms to the current national industrial policy requirements and helps to improve the current situation of heat supply. Thus if anti-pollution measures in the reports are strictly carried out and the 'Three Simultaneities' system is strictly implemented, the construction and post-construction will have obvious effects upon the surrounding environment. From the perspective of anti-pollution, the project construction is feasible.

V. Main contents of the abridged edition of environmental impacts reports

Project overviews; the current situation introduction of the natural, social environment and environmental quality of the construction site; engineering analysis, primary pollution sources of the project construction, the countermeasures taken and the treatment effects; predictions of possible effects upon the environment, measures of preventions or alleviations from the adverse effects upon the environment; conformity of project industrial policies and so on.

VI. Ways and the time limit of looking up the abridged edition of environmental impacts reports

The public can look up the abridged edition of environmental impacts reports through village committees, schools or hospital offices. The time limit is from May 4, 2015 to May 15, 2015. And it lasts for 10 workdays totally.

VII. Ways and the time limit for the supplementary information

The public can ask for the supplementary information from the construction units or the environmental assessment units through telephones, letters, faxes or emails. The time limit is from May 4, 2015 to May 15, 2015. And it lasts for 10 workdays totally.

VIII. Main contents for soliciting public opinions

Main issues for soliciting public opinions include public opinions towards the relevant environmental problems of the project construction. Include: whether the selected construction site is accepted or not? The effects of the project construction upon the surrounding environment, further anti-pollution measures and some other concerning public problems. The public can give opinions in written forms through emails, letters, faxes and other ways to give feedbacks to construction units or environmental assessment units. Please provide detailed contact information when voicing opinions for our convenience to give feedbacks of relevant information to you in time.

IX. Construction unit and contact information

Construction unit: Xingtai Xuyang Anneng Heating Co, Ltd.

Address: West of Shixiang village of the Yanjiatun Town in Xingtai County of Xingtai Email: yangxp@risun.com

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X. EIA agency and contact information

All Joint Energy Environmental Protection Technology Co., Ltd.

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Zip code: 050031 Contact: Wei Haiping, Zhang Dandan Tel: 0311-85082895

Fax: 0311-85616978 Email: nhshbs@263.net

2. Information Disclosure

After completing the outline of EIA, the construction units visited residential areas to inform the basic information to the relevant residents. Meanwhile, they notified the relevant governmental departments and other institutions respectively, which were Xingtai City Environmental Protection Bureau, Environmental Protection Bureau of Xingtai County, Xingtai City Construction Bureau, Traffic Bureau of Xingtai City, Land Resources Bureau of Xingtai City, Water Bureau of Xingtai City, Urban & Rural Planning Bureau of Xingtai City, Xingtai City Human Resources and Social Security Bureau, Xingtai Urban & Rural Planning Bureau (the competent department of sewage pipe network), Xingtai Women's Federation, Area Responsible Department, Competent departments of broadcasting and TV, Film and Television, Xingtai Railway Competent Department, Competent Department of Central Heating of Xingtai City, gas pipeline network companies, communication companies and electric power companies.

3. Questionnaire Survey (Public Consultation)

Personnel in construction units and environmental impact assessment units conducted the on-site sampling questionnaire survey to collect the public's opinions and suggestions in some sensitive points, such as the residential areas, units and relevant governmental departments within the heat supply range. They handed out the public consultation sheets, which were the common sheets used in this project and recovered them after they were filled in (the detailed form is shown in Table 11-1 and Table 11-2).

The residential areas and units in the questionnaire survey were as follows: Jiejiatun, Yi'an Garden, Residential Buildings for Beer Brewery, Gaozhu Building of Longqiang, Xingtai City Construction Bureau, Gemini Building of Xingtai, Harmonious Home, Hongsheng Yaju, Residential Buildings for Frame Factory, Yinfa Community, Yijin Garden, Tuanjie East Garden, Dongfang Xiyuan, Fuman Yuan, Shengdu Garden, Baihe Villa, Tiankuo Shangcheng, Jia Zhuang, Yongkang City Garden, Guangming Community, Baihe Villa, Tianfu House, Lijiazhuang, Huanwei Community, Qingqing Home, Xingtai Huafu Dermatosis Specialized Hospital, community health centers, the Fifth Team of Xingtai Traffic Department, Xingtai Criminal Police Unit, Hanting Hotel, Xingtai Guangci Hospital, Xingtai Central Heating Guidance Office, Yuban Experimental School, Fengchao Garden, Xinying Community, Yurangqiao Community, Dexin Garden, Xingtai Township Hospital, Yihai Garden, Tianhe Family, Kangnan Hospital. In the live survey, some sensitive points (Xingtai Zhongshan Hospital, Xingtai Mechanical and Electrical Vestibule School in Hebei) and institutions accepting heating (Xingtai Center for Disease Control, China Mobile, Unicom Building, Internal Revenue Service, Xingtai Tobacco Company) along the pipe network were unwilling to fill in the sheets and raised no opposite opinions on the project construction.

A. <u>Respondents</u>

135 personal questionnaires are handed out and all of them are recovered in the activity. The respondents accepting the survey included the grass-root cadres, workers, farmers and teachers in different ages and different levels. Their statistical result is shown in **Table 11-15**.

Table 11-15 Xingtai Subproject - Statistical Table of Participants in Questionnaire Survey

Sampling item		Analyzing result of participants (the percentage of the total population in the survey)	
		Number	Percentage (%)
Sex	Male	83	61.5
	Female	52	38.5
Age	18～35	41	30.4
	36～50	75	55.6
	Above 50	19	14.0
Occupation	Civil servant	78	8.9
	Worker	1	0.7
	Farmer	67	49.6
	Scientific and technical worker	7	5.2
	Others	48	35.6
Degree of education	Bachelor or above	18	13.3
	Senior high school	71	52.6
	Junior high school	43	31.9
	Primary school or below	3	2.2

B. Result of questionnaire survey

The analyses of the results of questionnaire survey are shown in **Table 11-16**.

Table 11-16 Xingtai Subproject - the Public Consultation Result Table of Questionnaire Survey

Survey item		Result	
		Number	(Percentage of the total population in the survey)
How do you get to know the information that this project is going to be in the construction?	Information disclosure	49	36.3
	Governments' notice	1	0.7
	Other people	47	34.8
	Other	38	28.2
Is your residence located in the heating areas or not?	Yes	115	85.2
	No	20	14.8
Do you think whether the implementation of this project will benefit the local (the urban area) heating conditions and economic development or not?	It will improve the situations of gas for domestic use.	91	67.4
	It is helpful for the exploitation and utilization of land in the pipeline network coverage.	11	8.2
	It will promote the development of urban economy.	25	18.5
	It does little work.	3	2.2
	No idea	5	3.7
Are you satisfied with the current heating conditions of your residence?	Very satisfied	11	8.1
	Satisfied	30	22.2
	Quite satisfied	43	31.9
	Dissatisfied	51	37.8
What do you think are the existing main environmental problems of this area?	Noise	18	13.3
	Dust	26	19.3
	Sewage	3	2.2
	Air pollution	78	57.8
	other	10	7.4
What do you think is the main environmental influence during the construction period of this project?	Noise	35	26.0
	Dust	59	43.7
	Sewage and mud	3	2.2
	Traffic jams	19	14.1
	Other	21	15.6
What's your attitude towards the proposed environmental protection measures during the construction period of this project as well as your requirements?	Agree and satisfied	128	94.8
	It needs to be improved and strengthened.	5	3.7
	Doesn't matter	2	1.5
What do you think is the influence of the implementation of this project on the residents?	It improves the heating quality.	125	92.6
	It improves the air quality.	10	7.4
	It has bad influence.	0	0
	It has no influence.	0	0
Do you think whether the construction of this project is necessary for the improvement of local residents' living quality?	Necessary	134	99.3
	Unnecessary	1	0.7
	Noncommittal	0	0
Do you support the construction of this project according to the advantages and disadvantages of this project?	Yes	107	99.1
	Doesn't matter	1	0.9
	No	0	0

Based on the analysis of the results above, 94.8% of respondents agreed the environmental protection measures which will be adopted in the project at construction stage. 92.6% believed that the consultation of this project may improve the heating condition. 99.3% thought it is necessary of this construction to improve the local residents' life quality. 99.1% supported this construction and none of them opposed it. Also nobody put forward the relevant asks and suggestions which were not listed in the questionnaire survey table.

4. Public Consultation Meeting and Questionnaire

After completing the draft of EIA report, construction unit convened three public consultation meetings and carried out three questionnaire surveys. The questionnaire is the common public consultation table used in this project (the detailed table is shown in Table 11-1 and Table 11-2).

A. The first public consultation meeting and questionnaire

After completing the draft of EIA report, construction unit convened the first public consultation meeting in the No.9 Conference Room on the north fourth floor of Xingtai Hotel in March 19, 2015. The participants were residents of Fengchao Garden, Yuban Experimental School, Zhaicun Village, representatives of all the governmental departments (Environmental Protection Bureau of Xingtai County, Land Resources Bureau of Xingtai City, Xingtai Urban & Rural Planning Bureau, Railway Office of Xingtai, Urban & Rural Planning Bureau of Xingtai City, Communications Bureau of Xingtai City, Water Bureau of Xingtai City, Xingtai Women's Federation, Xingtai City Human Resources and Social Security Bureau, Xingtai City Environmental Protection Bureau), personnel in construction units and environmental impact assessment institutions. We also invited Xingtai City Construction Bureau and Xingtai Central Heating Leadership Office which didn't send representatives to conference. In the meeting, EIA agency introduced the project background, project content, the diagram of pipeline route, impact and mitigation measures. Participants discussed about their concerned project content. And, construction unit handed out the questionnaires to them to collect their opinions, asks and suggestions.

16 questionnaires were handed out and all of them were recovered in this meeting. The respondents who filled in the questionnaire were the civil servants, workers, farmers and teachers. Their statistical results of questionnaire survey and public consultation tables are shown respectively in **Table 11-17** and **Table 11-18**.

Table 11-17 The First Public Consultation Meeting - Statistical Table of Participants in Questionnaire Survey

Sampling item		Analyzing result of participants (the percentage of the total population in the survey)	
		Number	Percentage (%)
Sex	Male	10	62.5
	Female	6	37.5
Age	18～35	2	12.5
	36～50	10	62.5
	Above 50	4	25.0
Occupation	Civil servant	9	56.3
	Worker	2	12.5
	Farmer	0	0
	Scientific and technical worker	1	6.3
	Others	4	25.0
Degree of education	Bachelor or above	12	75.0
	Senior high school	3	18.8

	Junior high school	1	50.0
	Primary school or below	0	0

Table 11-18 The First public Consultation Meeting - the Public Consultation Result Table of Questionnaire Survey

Survey item		Result	
		Number	(Percentage of the total population in the survey)
How do you get to know the information that this project is going to be in the construction?	Information disclosure	4	25.0
	Governments' notice	1	6.3
	Other people	3	18.8
	Others	8	50.0
Is your residence located in the heating areas or not?	Yes	8	50.0
	No	8	50.0
Do you think whether the implementation of this project will benefit the local (the urban area) heating conditions and economic development or not?	It will improve the situations of gas for domestic use.	11	68.8
	It's beneficial for the exploitation and utilization of the land in the area covered with the pipeline network.	1	6.3
	It will promote the development of urban economy.	3	18.8
	It does little work.	1	6.3
	No idea	0	0
Are you satisfied with the current heating conditions of your residence?	Very satisfied	3	18.8
	Satisfies	4	25.0
	Quite satisfied	7	43.8
	Dissatisfied	2	1.0
What do you think are the existing main environmental problems of this area?	Noise	1	6.3
	Dust	1	6.3
	Sewage	2	12.5
	Air pollution	12	75.0
	Others	0	0
What do you think is the main environmental influence during the construction period of this project?	Noise	2	12.5
	Dust	7	43.8
	Sewage and mud	1	6.3
	Traffic jams	5	31.3
	Others	1	6.3
What's your attitude towards the proposed environmental protection measures during the construction period of this project as well as your requirements?	Agree and satisfied	13	81.3
	It needs to be improved and strengthened.	3	18.8
	Doesn't matter	0	0
What do you think is the influence of the implementation of this project on the residents?	It improves the heating quality.	10	62.5
	It improves the air quality.	6	37.5
	It has bad influence.	0	0
	It has no influence.	0	0
Do you think whether the construction of this project is necessary for the improvement of local residents' living quality?	Necessary	16	100
	Unnecessary	0	0
	Noncommittal	0	0

Do you support the construction of this project according to the advantages and disadvantages of this project?	Yes	15	93.8
	Doesn't matter	1	6.3
	No	0	0

Based on the statistical results of both the conference and **Table 11-27**, 81.3% of respondents agreed the environmental protection measures which will be adopted in the project during construction. 62.5% believed that the consultation of this project could improve the heating condition. 100% thought that it is necessary of this construction to improve the local residents' life quality. And 93.8% supported this construction and none of them raised objection to it.

In the first public consultation meeting, units and participants approved the positive impact of Xingtai subproject construction. Meanwhile, they also put forward some opinions and suggestions. Construction units answered all the questions, which participants were very satisfied with. The opinions and the feedback in the first public consultation meeting are shown in **Table 11-19**.

Table 11-19 The First Public Consultation Meeting-Opinions Records and Answers

No.	Opinions	Answers and Feedbacks of Opinions
1	Construction wastes shall be placed in the location designated by Urban Management Bureau (sediment management unit) during construction.	EIA agency answered that the construction waste location is designated by urban management bureau instead of municipal departments. Respondents are satisfied.
2	What does the pipeline cost? Does it need to be upgraded within a family? Does the heating source ensure the heating in a long time? Will the heating source change, if the productivity of the company decreases?	Construction unit answered that pipeline construction cost is decided through the communication between construction units and property management company in the old residential areas. In the new residential area it is decided through the communication between construction unit and developer. The pipeline within the residence doesn't need to be upgraded. Based on the strength and development prospects of China Coal Xuuyang Enterprise, the stability of heating source can be ensured. Respondents are satisfied.
3	All the measures shall be reasonable and legitimate. The specific measure should be taken properly to ensure the heating safety.	Construction unit said that the implementation of this project strictly comply with the relevant state and local regulations. And all the safeguard measures are implemented properly to ensure the heating safety. Respondents are satisfied.
4	Construction is managed properly to reduce the influence on the urban traffic. Construction unit should communicate with the residential areas in advance to select the proper heating method.	Construction unit answered that measures in which construction should be divided for section by section, the channel is reserved in advance and construction timing is arranged reasonably are taken to reduce the impact on the urban traffic. In the stage of public consultation, residents in the sensitive points are informed with the project situation by the information notice, meeting and public consultation table. Construction unit said that they will communicate with residents about the specific heating way. Respondents are satisfied.
5	Sewage discharge should be reduced. It is prohibited to dispose sewage to Baima River in accordance with the relevant regulations.	EIA agency answered that sewage in soft water preparation system of primary pipe network is discharged into Xingtai Sewage Treatment Plant through the municipal sewage pipe network. Respondents are satisfied.
6	It should be implemented as early as possible.	Construction unit answered that it will be implemented on schedule in accordance with the scheduled construction time. Respondents are satisfied.

B. The second public consultation meeting and questionnaire

Construction unit convened the second public consultation meeting in the fourth conference room on the north third floor of Xingtai Hotel on March 27, 2015. Participants were representatives of Procuratorate of Qiaoxi District, Zhaicun Village, Urban Administrative Enforcement Bureau of Xingtai County, Xingtai Broadcasting and TV Station, the Central Hospital of Xingtai County, Traffic Management Team of Xingtai County, Shuren Middle School of Xingtai, Hebei Ophthalmic Hospital, Xingtai Second Middle School, Xingtai Municipal Bureau of Quality, Xingtai Vocational and Technical College, Xingtai Industrial and Commercial Bureau and representative of EIA agency. In the meeting, EIA agency also introduced the project background, project content, the diagram of pipeline route, impact and mitigation measures. Participants discussed about their concerned project content. And, construction unit handed out the questionnaires to them to collect their opinions, asks and suggestions.

In the meeting, 12 questionnaires were handed out and all of them were recovered. The respondents who filled in the questionnaire were the civil servants, workers, farmers and teachers. Their statistical result of questionnaire survey and public consultation tables are shown respectively in **Table 11-20** and **Table 11-21**.

Table 11-20 The Second Public Consultation Meeting-Statistical Table of Participants in Questionnaire Survey

Sampling item		Analyzing result of participants (the percentage of the total population in the survey)	
		Number	Percentage (%)
Sex	Male	11	91.7
	Female	1	8.3
Age	18～35	2	16.7
	36～50	6	50.0
	Above 50	4	33.3
Occupation	Civil servant	5	41.7
	Worker	1	8.3
	Farmer	0	0
	Scientific and technical worker	0	0
	Others	6	50.0
Degree of education	bachelor or above	9	75.0
	Senior high school	3	25.0
	Junior high school	0	0
	Primary school or below	0	0

Table 11-21 The Second Public Consultation Meeting - the Public Consultation Result Table of Questionnaire Survey

Survey item		Result	
		Number	(Percentage of the total population in the survey)
How do you get to know the information that this project is going to be in the construction?	Information disclosure	7	58.3
	Governments' notice	2	16.7
	Other people	1	8.3
	Others	2	16.7

Is your residence located in the heating areas or not?	Yes	7	58.3
	No	5	41.7
Do you think whether the implementation of this project will benefit the local (the urban area) heating conditions and economic development or not?	It will improve the situations of gas for domestic use.	6	50.0
	It's beneficial for the exploitation and utilization of the land in the area covered with the pipeline network.	1	8.3
	It will promote the development of urban economy.	5	41.7
	It does little work.	0	0
	No idea	0	0
Are you satisfied with the current heating conditions of your residence?	Very satisfied	3	25.0
	Satisfied	4	33.3
	Quite satisfied	3	25.0
	Dissatisfied	2	16.7
What do you think are the existing main environmental problems of this area?	Noise	0	0
	Dust	5	41.7
	Sewage	1	8.3
	Air pollution	6	50.0
	Others	0	0
What do you think is the main environmental influence during the construction period of this project?	Noise	2	16.7
	Dust	7	58.3
	Sewage and mud	0	0
	Traffic jams	3	25.0
	Other	0	0
What's your attitude towards the proposed environmental protection measures during the construction period of this project as well as your requirements?	Agree and satisfied	10	83.3
	It needs to be improved and strengthened.	2	16.7
	Doesn't matter	0	0
What do you think is the influence of the implementation of this project on the residents?	It improves the heating quality.	7	58.3
	It improves the air quality.	4	33.3
	It has bad influence.	0	0
	It has no influence.	1	8.3
Do you think whether the construction of this project is necessary for the improvement of local residents' living quality?	Necessary	12	100
	Unnecessary	0	0
	Noncommittal	0	0
Do you support the construction of this project according to the advantages and disadvantages of this project?	Yes	12	100
	Doesn't matter	0	0
	No	0	0

Based on the analysis of results the conference and Table 11-21, 83.3% of respondents agreed with the environmental protection measures which will be adopted in the project during construction. 58.3% believed that the consultation of this project can improve the heating condition. 100% thought it is necessary of this construction to improve the local residents' life quality. 100% supported this construction and none of them disagree with it.

In the second public consultation meeting, units and participants approved the positive impact of Xingtai subproject construction. Meanwhile, they also put forward some opinions and suggestions. Construction units answered all the questions, which participants were very satisfied with. The opinions and the feedback in the second public consultation meeting are shown in

Table 11-22.

Table 11-22 The First Public Consultation Meeting-Opinions and Answers

No.	Opinions	Answers and Feedbacks of Opinions
1	Is the pipe network involved in the area of Ophthalmic Hospital? Can the heating temperature be ensured after implementing the project?	Construction unit answered that the pipe network can be involved in the area of Ophthalmic Hospital. The heating temperature can be ensured, especially in the new residential areas. But due to the bad insulation effect in the old residential areas, the heating temperature is worse than that in the new residential areas. Respondents are satisfied.
2	Do residents need to pay the connection cost? By what standard?	Construction unit answered that residents need to pay the connection cost in accordance with the construction area and relevant governmental regulations. Respondents are satisfied.
3	Construction schedule should be speeded up	Construction units answered that project is implemented in accordance with the relevant regulations. It will be completed through guaranteeing both quality and quantity. And the construction schedule will be speeded up to implement the regional centralized heating as soon as possible. Respondents are satisfied.
4	Construction should be completed as soon as possible and guarantee both quality and quantity.	
5	Construction is hoped to implement in advance.	
6	It should be efficient and economical.	

C. The third public consultation meeting and questionnaire

Construction unit convened the third public consultation meeting in the fourth conference room on the north third floor of Xingtai Hotel on March 28, 2015. It is the largest conference in three public consultation meetings. Participants were representative from Yian Garden, Tuanjie East Garden, City Vocational Training Schools, Fuman Yuan, Community of Kong Village, Qingqing Home, Wenxin Garden, Hongxi Shuxiangyuan, Natural City, Shiji Mingdu, Shoujing Court, Shengdu Garden, Cold-strip steel co., LTD, Zhangdong Community, Mingshi Huating, Huiqian Building of Beidaguo, Lijiazhuang and EIA agency. In the meeting, EIA agency introduced the project background, project content, the diagram of pipeline route, impact and mitigation measures. Participants discussed about their concerned project content. And, construction unit handed out the questionnaires to them to collect their opinions, asks and suggestions.

In this meeting, 41 questionnaires were handed out and all of them are recovered. The respondents who filled in the questionnaire were the civil servants, workers, farmers and teachers. Their statistical results of questionnaire survey and public consultation tables are shown respectively in **Table 11-23** and **Table 11-24**.

Table 11-23 The Third Public Consultation Meeting - the Public Consultation Result Table of Questionnaire Survey

Sampling item		Analyzing result of participants (the percentage of the total population in the survey)	
		Number	Percentage (%)
Sex	Male	22	53.7
	Female	19	46.3
Age	18～35	14	34.1
	36～50	18	43.9
	Above 50	9	22.0
Occupation	Civil servant	1	2.4
	Worker	0	0

	Farmer	24	58.5
	Scientific and technical worker	6	14.6
	Others	10	24.4
Degree of education	Bachelor or above	17	41.5
	Senior high school	9	22.0
	Junior high school	15	36.6
	Primary school or below	0	0

Table 11-24 The Third Public Consultation Meeting - the Public Consultation Result Table of Questionnaire Survey

Survey item		Survey result	
		Number	(Percentage of the total population in the survey)
How do you get to know the information that this project is going to be in the construction?	Information disclosure	18	43.9
	Governments' notice	6	14.6
	Other people	11	26.8
	Others	6	14.6
Is your residence located in the heating areas or not?	Yes	29	70.7
	No	12	29.3
Do you think whether the implementation of this project will benefit the local (the urban area) heating conditions and economic development or not?	It will improve the situations of gas for domestic use.	17	41.5
	It's beneficial for the exploitation and utilization of the land in the area covered with the pipeline network.	10	24.4
	It will promote the development of urban economy.	13	31.7
	It does little work.	1	2.4
	No idea	0	0
Are you satisfied with the current heating conditions of your residence?	Very satisfied	2	4.9
	Satisfied	11	26.8
	Quite satisfied	14	34.1
	Dissatisfied	14	34.1
What do you think are the existing main environmental problems of this area?	Noise	9	22.0
	Dust	9	22.0
	Sewage	3	7.3
	Air pollution	15	36.6
	Others	5	12.2
What do you think is the main environmental influence during the construction period of this	Noise	9	22.0
	Dust	13	31.7

project?	Sewage and mud	2	4.9
	Traffic jams	14	34.1
	Others	3	7.3
What's your attitude towards the proposed environmental protection measures during the construction period of this project as well as your requirements?	Agree and satisfied	33	80.5
	It needs to be improved and strengthened.	8	19.5
	Doesn't matter.	0	0
What do you think is the influence of the implementation of this project on the residents?	It improves the heating quality.	20	48.8
	It improves the air quality.	19	46.3
	It has bad influence.	1	2.4
	It has no influence.	1	2.4
Do you think whether the construction of this project is necessary for the improvement of local residents' living quality?	Necessary	40	97.6
	Unnecessary	1	2.4
	Noncommittal	0	0
Do you support the construction of this project according to the advantages and disadvantages of this project?	Yes	40	97.6
	Doesn't matter	1	2.4
	No	0	0

According to the meeting and statistical results of the Table 11-24, 80.5 % of the respondents agreed with the proposed environmental protection measures adopted during the construction period of this project; 48.8% believed that the implementation of this project will improve the heat supply quality, while 2.4% thought that the implementation of this project would bring negative influence on residents (it will mainly influence the travel and living environment of residents during the construction period); 97.6% of the respondents considered that the construction of this project is necessary for the improvement of the local residents' living quality, with the number of respondents supporting the construction of this project being the same; no one raised objection to the construction of this project.

On the third public consultation meeting, the units as well as individuals that attended the meeting first affirmed the positive effects of the construction of the subproject in Xingtai. Meanwhile, they put forward some opinions and suggestions. The construction unit gave answers to these requirements and suggestions, which made the participants satisfied. As for some specific problems and comments that can't be answered in the meeting but needed further study, the construction unit will study with related institutions after the meeting, implement solutions and measures, and report the results to the participants who put forward the problems or opinions as well as related administrative department. The records and feedbacks of the opinions in the third public consultation meeting are shown in the **Table 11-25**.

Table 11-25 The Third Public Consultation Meeting-Opinions and Answers

No.	Opinions	Answers and Feedbacks of Opinions
1	Most of residential buildings on Tuanjie Street are new-built ones, so are they within the heat supply range?	The construction unit as well as the environmental impact assessment unit (EIA agency) indicates that most parts on the south area of Tuanjie Street are included in the heat supply range; during the construction period of this project, if any residential building has demands for heat supply, they will lay

		branch pipelines. The respondents are satisfied with the answers.
2	What preparations do we need to do if we want to take over the pipeline work of this project?	The construction unit as well as the EIA agency indicates that they can communicate with the construction unit in advance and account the related fees, with the specific cases contacting the Marketing Department of the company. The respondents are satisfied with the answers.
3	Do the residential buildings that already have central heating along the pipelines need to lay new pipelines to be connected with the network?	The construction unit says it's not necessary. The respondents are satisfied with the answers.
4	What are the charging standards of connecting with the network?	The construction unit indicates that the fees are paid according to construction areas generally, with the price uniformly stipulated by the government. The respondents are satisfied with the answers.
5	Because of the influence of the construction during the rainy season, the mud on roads will cause inconvenience to walking and driving.	The EIA agency indicates that the construction of this project will keep off the rainy season to the greatest extent; the pipelines will be constructed in sections, with dam boards set up to prevent mud; when digging roads, they will stack the mud temporarily and refill in time to reduce the negative influence on residents' travel. The respondents are satisfied with the answers.
6	The quicker the project is implemented, the better it is for this area.	The construction unit indicates that the project will be completed with its quality and quantity assured according to relevant regulations; they will speed up their implementation schedules to realize the central heating in this area as soon as possible. The respondents are satisfied with the feedback.
7	To start constructing and get benefits as soon as possible.	
8	It's a good need, which needs to be implemented as soon as possible.	
9	To speed up the construction schedules and realize heat supply early.	
10	To speed up the construction schedules to realize heat supply early and utilize resources comprehensively.	
11	To speed up the process.	
12	We hope that the project can be operated as early as possible, for it really improves people's life.	
13	We hope that the project can be started as soon as possible.	
14	We hope that the project can be started early so that it can make residents' life better.	
15	To start constructing early.	
16	To speed up the construction.	

5. Focus Discussion

After the first draft of the EIA Report was prepared and the three public consultation meetings were held, the construction unit as well as the EIA agency visited the related government departments and other relevant interest institutions together and had a full communication with beneficial units; the EIA agency introduced the possible environmental influence of this project as well as the mitigation measures established aiming at reducing the environmental influence. These institutions expressed their opinions, comments and requirements that they're concerned about, and meanwhile, they were satisfied with the mitigation measures. The construction unit

indicated that they will strengthen management and implement the management plan and mitigation measures to guarantee the smooth implementation of this project according to the requirements of each department. The results of the focus discussion are collected in details in the **Table 11-26**.

Table 11-26 Opinions and Requirements from the Beneficial Units about Xingtai Subproject

No.	Units visited	Opinions and requirements from the beneficial units
1	Environmental Protection Bureau of Xingtai County	During the construction period of this project, they should pay attention to watering the ground and covering the raw materials and earthwork that are staked in the open air; they should use low-noise facilities and equipments to the greatest extent to reduce the influence on residents around; they should also pay attention to washing tires from the vehicles that go in and out of the construction plants to reduce the generation of dust. During the operation period, they should pay attention to the maintenance of the pipeline network to avoid the dissipation of toxic and harmful substances; they need to classify and pile up household garbage uniformly and send it to refuse processing plants in time.
2	Land Resource Bureau of Xingtai City	Xuyang Anneng's central heating project is a good project that benefits people's livelihood, which covers a relatively smaller area of lands and conforms to the related land use planning. We hope that during the construction process of the project, the enterprise will plan reasonably, utilize lands efficiently and carry out relevant procedures as soon as possible to realize the heat supply in Xingtai at the end of this year.
3	Urban & Rural Planning Bureau of Xingtai City	According to the urban planning as well as the reality that Xingtai is lack of stable heat sources, we agree with the implementation of the central heating project by Xuyang Anneng. We hope that the enterprise will investigate and study thoroughly, collect heat demands in a detailed manner and plan and lay out heat load scientifically during its implementation process to avoid blind development and wasting of resources.
4	Xingtai City Construction Bureau	Xingtai City is lack of stable heat sources for a long term, so residents usually depend on coal-fired boilers, gas-fired boilers and wall-hanging stoves to solve their heat problems temporarily in winter, which brings many problems such as short of natural gas supply in winter and environmental pollutions. The implementation of Xuyang Anneng's central heating project will provide stable heat sources for Xingtai City, so it's a livelihood project that we support. We hope that during the implementation and operation processes of this project, the enterprise will not only guarantee the quality of heat supply, but also provide high-standard service for residents; we also hope that this project will be implemented as soon as possible to realize the heat supply before the end of 2015.
5	Water Resource Office of Water Supply Bureau of Xingtai County	During the implementation process of Xuyang Anneng's central heating project, it should fully consider from aspects such as systems and management, save water and protect water resources; at the same time, it should also strengthen the efforts to deal with sewage, put an end to pollution phenomena such as the dissipation of toxic and harmful substances and protect water resources.
6	Women's Union of Xingtai City	During the implementation process of this project, it should set up barriers or add safety signs to the notable positions when digging roads or laying pipelines to guarantee the personal safety of women and children; in addition, the construction should keep away from rush hours to work or school to the greatest extent.
7	Xingtai City Human Resources and Social Security Bureau	The implementation process of this project should consider the employment settlement of the original boiler staff in the related residences and give preference to them when recruiting new employees to properly relocate the related personnel as much as possible.
8	The Competent Departments of the Site	We hope that Xuyang Anneng will carry out the construction and operation of this project strictly according to relevant regulations, and strengthen management, save energy and protect the environment during its operation process.
9	Communication Association	There are communication pipelines under the ground within the area from 107 National Highway to Ren County, and communication pipeline network in the middle of Xingzhou Avenue, so it should construct carefully in the relevant sections; before the construction of the pavements and roads around, it should strengthen coordination and communication with related communication departments to guarantee the safety of communication facilities.
10	Broadcasting and TV Stations	During the construction and operation processes of this project, it should reduce the noise of the equipments to the greatest extent and not influence the normal power supply; meanwhile, it should also consider the possible electromagnetic interference to avoid the variation in voltage of pipelines and electromagnetic interference which may influence the normal operations of broadcast and TV stations.
11	Railway Office	It should pay attention to the protection of the railways when the heat supply network crosses the railways.
12	Power Supply Bureau of Xingtai County	It should save electricity; when each pump station brings in power supply, it should select the power access points according to corresponding electrical load to guarantee the normal operations of the equipments.
13	Administrative Enforcement Bureau (Administrative Department of	Before construction, it should plan in advance to avoid digging roads as much as possible; it should also consider the rainwater and sewage generated from the construction and operation processes of this project to guarantee the simultaneous construction and operation of the sewage disposal facilities and the project; the discharge of sewage such as industrial wastewater and domestic sewage should have corresponding approval processes in advance.

	Sewage Pipe Network) of Xingtai City	
14	Transportation Bureau of Xingtai City	During construction, it should pay attention to the coordination and communication with road competent departments; it should avoid digging roads; when the pipelines cross highways in the air, the height from the pipelines to the ground must be more than 6m, however, when the pipelines cross highways under the ground, the height from the pipelines to the ground must be more than 3m; it should also try its best to lay pipelines in the area that its distance from the roadbeds is more than 1m to reduce investments.

All the problems, opinions and suggestions put forward by the beneficial units in the Table 11-26 had basically got full consideration in analyzing the environmental influence and establishing mitigation measures. The mitigation measures of the environmental influence included the contents and requirements that these beneficial units care about.

6. Summary of Public Consultation Activities

The summary of the conditions and results of the two rounds of public consultation activities of the Xingtai Subproject are shown in the **Table 11-27** in details.

Table 11-27 Xingtai Subproject--Summary Table of Situations and Results of Two Rounds of Public Consultation

Round	Date	Place	Participant	Method and Main Content	Main Problem Concerned by Interested Party	Handling Method and Result of the Problem Concerned
1st Round	February 5 to 7, 2015	Xingtai No. 2 Middle School, Dongfang Xiyuan, Natural City, Longqiang Residential Building, Tuanjie East Gardeb, Shuian Lanting, Fangyuan Living Quarters, Eye Hospital of Hebei Province, Xingtai Guangci Hospital, Xingtai Huafu Dermatosis Specialized Hospital, Shengdu Garden, the Central Hospital of Xingtai County, Huanwei Community, Lily Villas, Warm Home, Lily Noble Villas, Binhe Qingqing Home, Naval Port Home, Tiankuo Shangcheng, Hongxi Community, Xingtai Vocational and Technical College, Lily Garden, Xingtai Mechanical and Electrical Industrial School of Hebei Province, Kongfu Garden, community health centers	Local residents and institutions from sensitive spots such as residential district, schools and hospitals along the pipe network.	Project information disclosure: to put up notices about the first and second phase of the project in sensitive spots such as residential district, schools and hospitals along the pipe network; Main contents of the notices: project overview, names and contact information of the construction unit and environment impact assessment unit, working procedures and main working contents of environment impact assessment, major items that need the public's opinions and main methods for the public to put forward their opinions; introduction to basic information of the project.	/	/
	March 17 to 30, 2015	Century Minto, Jiejiatun Village, Xingtai Shuren Middle School, Xingtai Second Middle School, Zhaicun Village Community, Zhaicun Village, Eye Hospital of Hebei Province, community health centers, Xueyuan Kindergarten, Lijiazhuang, Xingtai Zhongshan Hospital, Fangyuan Living Quarters, Shuian Lanting, Tianfu Community, Tuanjie East Garden, Natural City, Longqiang Residential Building, Dongfang Xiyuan, Xingtai Wenqiao Infertility Specialized Hospital, Residential Buildings for Beer Brewery, Fuman Yuan, Xingtai Guangci Hospital, Shengdu Garden, Xingtai Huafu Dermatosis Specialized Hospital, the Central Hospital of Xingtai			/	/

		County, Lily Villas, Huanwei Community, Warm Home, Lily Noble Villas, Binhe Qingqing Home, Naval Port Home, Hongxi Community, Tiankuo Shangcheng, Gemini, Huayang Residence, Shengshi Residence, Jinyu Shoufu, Zhangdong Community, Lily Garden, Jiazhuang, Xingtai Vocational and Technical College, Xingtai Mechanical and Electrical Industrial School of Hebei Province, Kongfu Garden, Beidaguo Back-moving Residence				
	March 27 to April 10, 2015	Xueyuan Apartment, Yijin Garden, Hongsheng Yaju, Harmonious Home, Residential Buildings for Paper Mill, Yinfa Community, Yongkang City Garden, Guangming Community, Residential Buildings for Transformer Factory, Residential Buildings for Frame Factory			/	/
	February 2015	Relevant residential districts	Relevant residential district	Notification through visiting residences: the construction unit will visit each residential district to inform the basic information of the project to residents in each residential district.	/	/
	February 2015	The construction units	Xingtai City Environmental Protection Bureau, Environmental Protection Bureau of Xingtai County, Xingtai City Construction Bureau, Transportation Bureau of Xingtai City, Xingtai Land Resource Bureau, Xingtai Water Supply Bureau, Xingtai Urban & Rural Planning Bureau, Xingtai Human Resources and Social Security Bureau, Xingtai Urban Administrative Enforcement Bureau (the	The construction unit will inform the basic information of the project to relevant government departments as well as other related institutions respectively by telephone.	/	/

			competent department of sewage pipeline network), Xingtai Women's Federation, competent departments of the area, competent departments of broadcasting and TV, Xingtai Railway Competent Department, Competent Department of Central Heating of Xingtai City, gas pipeline network companies, communication companies, electric power companies, etc.			
	April 14 to 25, 2015	Fengchao Garden, Yihai Garden, Yurangqiao Community, Yuban Experimental School, Xingtai Township Hospital, Xingtai Kangnan Hospital of Traditional Chinese Medicine, Xinying Community, Tianhe Home, Dexin Garden	Local residents and institutions from sensitive spots such as residences, schools and hospitals along the pipeline network.	Project information disclosure: Notices about the first phase of the project will be put up in sensitive spots such as residences, schools and hospitals along the pipeline network; Main contents of the notices: project overview, the possible influence caused by the construction project on the environment, countermeasures to prevent or reduce the unfavorable environmental influence, the main points of environment impact assessment results, names and contact information of the construction unit and environment impact assessment unit, major items that need the public's opinions and main methods for the public to put forward their opinions.	/	/
2nd Round	March 19, 2015	No.9 Conference Room on the north fourth floor of Xingtai Hotel	Representatives from residences along the pipeline network (at least 3), representatives from schools and hospitals (at least 1), representatives from	The first public consultation workshop: the EIA institute asked for consultation from the public about the first draft of	The details are shown in the Table 11-28	

			each government department (at least 1), and representatives from units that receive heat supply (at least 1). The specific representatives are as follows: Environmental Protection Bureau of Xingtai County, Xingtai Land Resource Bureau, Xingtai Urban Administrative Enforcement Bureau, Xingtai Railway Office, Xingtai Urban & Rural Planning Bureau, Transportation Bureau of Xingtai City, Xingtai Water Supply Bureau, Xingtai Women's Federation, Xingtai Human Resources and Social Security Bureau, Xingtai City Environmental Protection Bureau, representatives from Fengchao Garden Community, representatives from Yuban Experiment School, and representatives from Zhaicun Village Community. (Note: Xingtai City Construction Bureau and Competent Department of Central Heating of Xingtai City don't show up after invitation.)	Environmental Impact Statement, reflected the public's opinions and suggestions to relevant departments and gave feedback timely, and considered these opinions and suggestions in its statement. The questionnaire survey during the workshop.	
	March 27, 2015	No.9 Conference Room on the north fourth floor of Xingtai Hotel	Representatives from residences along the pipeline network (at least 3), representatives from schools (at least 1), representatives from government department (at least 1), and representatives from units that receive heat supply (at least 1). The specific representatives are as follows: Procuratorate of Qiaoxi District, Zhaicun Village, Urban Administrative Enforcement Bureau of Xingtai County, Xingtai Broadcasting and TV Station, the Central Hospital of Xingtai County, Traffic Management Team of Xingtai County,	The second public consultation workshop: the EIA institute asked for consultation from the public about the first draft of Environmental Impact Statement, reflected the public's opinions and suggestions to relevant departments and gave feedback timely, and considered these opinions and suggestions in its statement. The questionnaire survey during the workshop.	The details are shown in the Table 11-31

			Xingtai Shuren Middle School, Hebei Ophthalmic Hospital, Xingtai Second Middle School, Xingtai Municipal Bureau of Quality, Xingtai Vocational and Technical College, Xingtai Industrial and Commercial Bureau		
	March 27, 2015	No.9 Conference Room on the north fourth floor of Xingtai Hotel	Representatives from residences along the pipeline network (at least 3), representatives from schools and hospitals (at least 1), representatives from each government department (at least 1), and representatives from units that receive heat supply (at least 1). The specific representatives are as follows: Yi'an Garden, Tuanjie East Garden, Xingtai Occupational Training School, Fuman Yuan Community, Kong Village Community, Qingqing Home, Warm Home, Hongxi Shuxiang Garden, Natural City, Century Minto, Shoujing Community, Shengdu Garden, Cold Rolled Steel Co., Ltd, Zhangdong Community, Mingshi Huating, Beidaguo Back-moving Buildings, Lijiazhuang	The third public consultation workshop: the EIA institute asked for consultation from the public about the first draft of Environmental Impact Statement, reflected the public's opinions and suggestions to relevant departments and gave feedback timely, and considered these opinions and suggestions in its statement. The questionnaire survey during the workshop.	The details are shown in the Table 11-34
	March 28, 2015 and March 30, 2015	Sensitive spots along the pipe network, relevant government departments as well as units that receive heat supply	Jiejiatun, Yi'an Garden, Residential Buildings for Beer Brewery, Longqiang Residential Building, Xingtai City Construction Bureau, Gemini Building of Xingtai, Harmonious Home, Hongsheng Yaju, Residential Buildings for Frame Factory, Yinfa Community, Yijin Garden, Tuanjie East Garden, Dongfang Xiyuan, Fuman Yuan, Shengdu Garden, Lily Noble Villas, Tiankuo Shangcheng, Jia Village, Yongkang City Garden, Guangming Community, Lily Villas, Tianfu Home,	Questionnaire survey Environmental impact of the project Opinions and suggestions about the project constructiont	The details are shown in the Table 11-25

			Lijiazhuang, Huanwei Community, Qingqing Home, Huafu Dermatosis Specialized Hospital, community health centers, the Fifth Team of Xingtai Traffic Department, Xingtai Criminal Police Unit, Hanting Hotel, Xingtai Guangci Hospital, Xingtai Central Heating Guidance Office		
	May 2015	Office locations of each relevant unit	Environmental Protection Bureau of Xingtai County, Xingtai City Construction Bureau, Competent Department of Central Heating of Xingtai City, administrative departments of the industrial area, gas pipeline network, sewage pipeline network, provincial roads, communication, broadcasting and TV and electric power	Specific Discussion Contents: the specific environmental impact of the implementation of the project, as well as mitigation and improvement measures and plans	These institutions indicated the problems that they were concerned about as well as their opinions and requirements. Meanwhile, they were satisfied with the established mitigation measures about the environmental impact. The construction units expressed that they would strengthen management and implement management plans and mitigation measures to guarantee the smooth implementation of the project. The details are shown in the Table 11-35.

7. Social evaluation analysis

The "social evaluation" on all sub-projects has been carried out by seminars, interviews, questionnaires and other forms. Through these activities, more people within the project area have leant more comprehensive information about the project and have expressed their attitudes and demands for the project. For the Social evaluation public consultation and information release activities, see **Table 11-28.**

Table 11-28 Xingtai sub-project-- For the Social evaluation public consultation and information release activities

The main benefit stakeholders	Attitude toward the project	Demand
Project Service Group	Support	1) Urgent hope to start the project as early as possible. 2) Hope to improve the quality of heating supply; 3) The housing maintenance fund paid to the housing management office is expected to be used to pay for the pipe network transformation and the government is expected to help some poor people and old residential quarter's access to the new network with gas subsidies.
The group who shall be impacted by replacing the natural gas boiler	Support	1) The small boiler room seasonal workers who hope to be able to work for the heat relevant work after the project completed; 2) Hope that the Government will provide the employment information, and some people also hope that the Government may provide technical training opportunities. 3) Boiler room owner hope that the project may be started and completed as soon as possible.
Groups impacted by the project construction	Support	1) The Owner is expected to properly prepare construction plans to relieve inconvenience for people, especially to protect the safety of students on the way to and from school; 2) Appropriate measures are expected to be taken to minimize the impact of construction noise and dusts on the normal life of the surrounding residents; 3) Store owners expect to lay the pipeline network by sections and periods to minimize the impact on retail business;
Vulnerable groups	Support	1) Older people, people who are experiencing difficulties and hope to reduce the cost of access of the network, remold costs of pipe and network in the courtyard. 2) Women and the older people hope the heat supply company improve the quality of heat supply further, flexible in heat supply start and end date in accordance with changes of the weather. 3) The women puts forward that supervision of the construction unit shall be strengthened, so as to ensure the safe construction, in particular to protect children on their way to school.
Project owner/construction unit	Support	Hope the project construction process successfully
Xingtai City government, Qiaodong and Qiaoxi district government	Support	Hope the project construction process successfully
The project covers 6 street offices/township government and its neighborhood committee and village committee	Support	1) Hope to implement the project as soon as possible. 2) Suggest the owners and construction units try to communicate with the impacted residents and units to avoid any contradictions or conflicts; 3) Hhope that the municipality and owners may deduct partial access fees for poor families.

From the above table we may find that the people from the various interest groups expressed their support to the project. Residents surveyed believe that the project will improve the heating quality and be helpful for individual life and health. Therefore, many people appreciate some negative impact on their lives and work. Social evaluation questionnaire survey results show that 92.0 % of the population supports the construction of the project.

Through workshops and interviews, we have learnt that boilermakers are mostly seasonal workers and most of them want to work in heating companies (such as various heat exchange substations after completion of the project) or turn to be plumbers, while some people hope that the Government could provide more employment information; and women and the old ones expect the heating company to further improve the heating quality.

With respect to the question that "who do you want to make comments on the project", 94.9% of respondents answered community committees, 2.6% answered street office or district government, and 2.6% answered project owners or municipal government. Accordingly, a convenient and effective Appeal channel is needed to be established. It is proposed to set up a public opinion group composed of representatives of residents (including women and people from poor families), street offices, communities, owners, fireman and other groups to regularly discuss, communicate, implement and resolve different opinions.

8. Summary

According to the results of two rounds of public polls for Xingtai Subproject, stakeholders and the public have generally satisfied with measures and solutions taken by the Subproject against issues they widely concerned. The results of consultation participated by the public showed that about 98% of the public supported the project without objection.

11.4.4 Zhangjiakou sub-project

1. Public disclosure of Information

Zhangjiakou sub-project conducted public disclosure twice. The first time shall adopt publicity online and post publicity after the environment evaluation work plan completed. After completion of the first draft, the draft environmental impact assessment report and draft environmental management plan will be fully published for public review. The environmental assessment report and environmental management plan shall be filed in the construction unit office. Meanwhile, an disclosure shall be published on the local newspaper to notify the public that they may access to the environmental impact assessment report and environmental management plan on the Internet to understand the project information. They can also go to the construction unit to view the EIA report and respond their aspirations or advice and also advised that the environment evaluation Unit will collect feedback and respond the same. Sub-project information public disclosure summary, see **Table 11-29**.

Table 11-29 Zhangjiakou Sub-project - Public Disclosure Summary Information

Turn	Way	TIME	Place/Web site	Remarks:
The first turn	Public disclosure on the Internet	Jan., 22,2015 to Feb., 04, 2015	Zhangjiakou Qiaodong District government web site: http://www.zjkqd.gov.cn/	No feedback received during the validity period of public disclosure.
	Post publicity	Jan., 22～Feb., 4	No. 3 family dormitory building of China Unicom Company, family dormitory building of No. 251 hospital, City Building Department of Zhangjiakou Qiaodong district, residence community of traffic police, Zhangheng New town, Weihua Primary School, Qiaodong hospital, Fuan community, Dongshan caiju phase II, No. 24 courtyard of Hanqiao street	It involves 10 communities and units, and the public disclosure places are the main entries; No feedback received during the validity period of public disclosure.
The second turn	Newspapers bulletin	March 20, 2015	Zhangjiakou City evening newspaper	No feedback received during the validity period of public disclosure.
	Post publicity	March 9,2015 to March 20	No. 3 family dormitory building of China Unicom Company, family dormitory building of No. 251 hospital, City Building Department of Zhangjiakou Qiaodong district, residence community of traffic police, Zhangheng New town, Weihua Primary School, Qiaodong hospital, Fuan community, Dongshan caiju phase II, No. 24 courtyard of Hanqiao street	It involves 10 communities and units, and the public disclosure places are the main entries; No feedback received during the validity period of public disclosure.
	Public disclosure	3.9～3.20	Zhangjiakou Qiaodong District government web site: http://www.zjkqd.gov.cn/	No feedback received during the validity period of public disclosure.

	on the Internet			
	Constructi on unit Place the file	March 9～ March 20	No. 9 Yangjiafenbeilu road, Qiaodong district, Zhangjiakou city Zhangjiakou City Dongyuan Heating Power Co., Ltd.	No feedback received during the validity period of public disclosure.

The information contents for public disclosure in the first time include: Basic project situation (project name, address, scale and content), the working process and contents for environment evaluation, and major matters for seeking the public opinion, public feedback methods and contact ways of the related units, and so on. The information contents for public disclosure in the second time include: the main thing is to inform the Environment evaluation report preparation work has been completed, the public read the full text on the web site or in the construction unit, and may send feedback, suggestions and other information directly on the web or by phone or fax. For the information public notified in the last two times, see **Table 11-30**. During the validity period when all information is published, neither objection to the project nor any feedback on significant adverse environmental impacts has been received.

Table 11-30-1 Zhangjiakou sub-project - the 1st contents for public disclosure for the project information

"World Bank Financed Centralized Heating and Affordable Housing Supporting Facilities Project for Qiaodong District Zhangjiakou" project
The first publicity of the environmental Impact Assessment participated by the public

According to the "Environmental Protection Law of the People's Republic of China" and "Interim Measures on Public Participation in Environmental Impact Assessment" ([2006] No. 28), in order to collect public comments and suggestions on the "World Bank Financed Centralized Heating and Affordable Housing Supporting Facilities Project for Qiaodong District Zhangjiakou", the EIA is firstly publicized now to disclose the relevant environmental assessment information and seek for opinions and suggestions on the environmental impact (including social impacts) of the project. The Bulletin of Project related matters are as follows:

I. Overview of Construction project

Project name: "World Bank Financed Centralized Heating and Affordable Housing Supporting Facilities Project for Qiaodong District Zhangjiakou"

Building Location: Qiaodong district, Zhangjiakou City, Hebei Province

Construction content and scale: Qiaodong District Zhangjiakou has an area of heating for 10.27km², while the project will cover most area of Qiaodong District. The specific construction content and scale are as follows:

(1) A pressure isolating heat exchange station with a heating area of 3,880,000 m2 shall be constructed, which shall cover a construction area of 2400m^2 (including the schedule center) and a land area of about 2 mus.

(2) Newly build zero-level, Level 1 hot water pipe network, the slot length is 20.5 Km.

(3) Newly build and use small boiler room remould 58 heat sites; newly build 17 heat sites.

(4) Utilize the present situation regional coal-fired boiler room remoulds 2 sets 70 MW gas hot water boiler.

(5) Set up building Heat metering device in the existing 1340 residential buildings communities.

II. Environment evaluation work procedures and Main working contents:

Procedures for the environmental impact assessment: accept the commission – understand information on the project – seek for opinions of the relevant departments – have an environmental background investigation – monitor the current environmental quality – assess the environmental impact of noise, water, air, ecology and other factors – enable public participation – take project feasibility study and measures to relieve environmental impacts - prepare the project environmental impact assessment report. Main working contents will include:

(1) General provisions: it will incorporate the project origin, evaluation level, evaluation scope, evaluation criteria, environmental protection goals and other contents.

(2) Environmental policy, legal and regulatory framework and basis for preparation: it will cover the legal and regulatory basis of the proposed project, basis for preparation of reports, urban planning, air pollution control planning and environmental function zoning document, and analysis on the compliance of the proposed project with the relevant district policies and plans.

(3) Project description: it will analyze and explain the construction background, construction contents and construction methods of the project.

(4) Status of the surrounding environment quality: it will describe the natural and social environment and environment quality state surrounding the project (including air, surface water, ground water, sound).

(5) Predicted environmental impact assessment and environmental protection measures: it will analyze the impact of wastewater, waste gas, noise and solid waste on the surrounding environment during the project construction and operation.

(6) Analysis of alternatives: it will include the comparison of the "With Project" and "Without Project", comparison of heating alternatives, comparison of new heat exchange substation locations and comparison of heating network layout plans (pipeline alignment) and other contents.

(7) Environmental risk analysis and mitigation measures: it will cover the environmental risk identification, environmental risk impact analysis, environmental risk prevention and mitigation policies and measures.

(8) Analysis on land acquisition and relocation impact: it will analyze the reasonableness of the land acquisition and relocation plans, as well as the social impact.

(9) Public participation: it will collect public comments on the proposed project.

(10) Environmental management plan: it will cover the environmental management structure, environmental management training, environmental protection measures, environmental monitoring programs and other contents.

(11) Conclusions and recommendations: including a comprehensive evaluation conclusions and recommendations.

III. Items of Questionnaires:

(1) the public's perception and attitudes towards the information source, site selection and other information of the project; (2) the public's awareness of the role of the project in promoting the economic and social development; (3) the public's awareness of the environmental impact of the project on personal interests; (4) environmental issues that the public is most concerned about and environmental protection countermeasures required; (5) the public's opinions, recommendations and specific requirements on environmental protection measures of the project.

IV. The main ways of putting forward the public opinions:

Individuals or institutions can submit oral or written comments to the construction unit and environmental impact assessment unit via telephone, mail, e-mail and other means (please provide detailed contact information as much as possible, including name, occupation, education, address and telephone number).

The environmental impact assessment unit shall truthfully record public comments and suggestions in the EIA report and feed back them to the construction unit, design institution and other relevant departments.

V. Beginning and ending time of public disclosure

The time of the information publicity is from January 22, 2015 ~ February 4, 2015.

VI. Public Contact way:

Development unit: Zhangjiakou City Dongyuan Heating Power Co., Ltd.

Address: No. 9 Yangjiafenbeilu road, Qiaodong district, Zhangjiakou city

Postal code: 075000

Contact: Zhou Haizhen

Contact telephone: 0313-2113318

email：zjkdyrlgs@163.com

Environmental Impact Assessment agency: Zhangjiakou City Environmental Science Research Institute

Address: Environmental protection Mansion, No. 6 Weisan Road, Zhangjiakou city

Postal code: 010010

Contact: Shi Zheng

Tel: 4083086

email：zjkhky@163.com

Zhangjiakou City Dongyuan Heating Power Co., Ltd.

January 22, 2015

Table11-30-2 Zhangjiakou Sub-project - the 2nd Contents for Public Disclosure for the Project Information

"World Bank Financed Centralized Heating and Affordable Housing Supporting Facilities Project for Qiaodong District Zhangjiakou" project
The second publicity of the environmental Impact Assessment participated by the public

According to the "Environmental Protection Law of the People's Republic of China" and "Interim Measures on Public Participation in Environmental Impact Assessment" ([2006] No. 28), in order to collect public comments and suggestions on the "World Bank Financed Centralized Heating and Affordable Housing Supporting Facilities Project for Qiaodong District Zhangjiakou", the EIA is firstly publicized now to disclose the relevant environmental assessment information and seek for opinions and suggestions on the environmental impact (including social impacts) of the project. The Bulletin of Project related matters are as follows:

I. Overview of Construction project

Project name: "World Bank Financed Centralized Heating and Affordable Housing Supporting Facilities Project for Qiaodong District Zhangjiakou"

Building Location: Qiaodong district, Zhangjiakou City, Hebei Province

Construction content and scale: Qiaodong District Zhangjiakou has an area of heating for 10.27km², while the project will cover most area of Qiaodong District. The specific construction content and scale are as follows:

(1) A pressure isolating heat exchange station with a heating area of 3,880,000 m2 shall be constructed, which shall cover a construction area of 2,016m2 (including the schedule center) and a land area of about 2.84 mus.

(2) Newly build zero-level, Level 1 hot water pipe network, the slot length is 20.5 Km.

(3) Newly build and use small boiler room remould 58 heat sites; newly build 17 heat sites.

(4) Utilize the present situation regional coal-fired boiler room remoulds 2 sets 70 MW gas hot water boiler.

(5) Set up building Heat metering device in the existing 1340 residential buildings communities.

II. The construction project may cause the impact to the ecological environment, its countermeasure and measures

(1) Construction period

a) Exhaust gas: Air pollution source are mainly from construction machinery exhaust gas and dust.

b) Waste water: water pollution includes the sewage of the construction team, equipment washing water in the construction area and pipe pressure test wastewater. All wastewater shall be discharged into the nearest municipal sewage pipe network;

c) Noise: the sound impact on the environment is mainly from the construction machinery and equipment. Due to high noise intensity within the construction site, nearby residents will be inevitably impacted;

d) Solid Waste: the solid waste is mainly from the construction waste (including residual soil) and a small amount of household garbage. Among them, the former shall be transported to designated locations for landfill, while the later shall be removed by the sanitation sector.

e) Ecology: trench excavation and temporary land occupation for laying will damage to the structure and physical properties of the soil, while dusts generated will adversely impact the vegetation along the road.

Through improvements in the construction management, scientific and standardized construction, and strict implementation of relevant laws and regulations in Hebei Province and of appropriate measures can effectively relieve the environmental impact during the construction period. Otherwise, the ecological environmental impact during the construction period will be temporary and reversible and may disappear with the completion of construction activities. Thus, the impact to the surrounding environment during the construction period is acceptable.

(2) Operation period

a) Exhaust gas: the implementation of the project for the Environment has significant positive benefits. In addition, the centralized heating can improve the thermal efficiency, reduce energy consumption, reduce air pollutants and greenhouse gas emissions and finally improve the local air quality;

b) Waste water: the waste water during operating period is mainly from regular washing of the softening water system (using ion-exchange resin) and wastewater generated by resin regeneration, as well as swage generated by on-duty operators. After pretreatment at the septic tank, the waste water will be discharged into the municipal sewer network and eventually enter into the sewage treatment plant in main urban area of Zhangjiakou to meet the relevant standards;

c) noise: as the noise at the pressure isolating heat exchange station is mainly from the circulating pump and making-up pump and the noise at the gas-fired boiler is mainly from burners and blowers, effective damping, sound insulation and other measures may significantly reduce impact on the surrounding environment.

d) Solid waste: solid waste is mainly from on-duty operators, which is expected to be 0.75t/a and periodically removed by the sanitation department.

III. Impact, countermeasures and measures to the social environment

No rural collective land shall be expropriated in the project. The project does not involve the rural collective land housing demolition and only needs a small amount of state-owned land. During the construction period, the adverse social and environmental impacts may include local traffic congestion and transmission of diseases among immigrant construction workers, while positive effect may include the prosperity of the local market and increase in local employment. Effective construction management and scientific arrangement of construction can effectively reduce the negative impact. In addition, the impact during the construction period will be temporary and may disappear after the construction.

After putting into operation, the negative impact shall be replaced by re-employment of long-term staff of small boiler rooms. In terms of the positive impact, the project will improve the stability of heat supply and residents' health level, promote energy conservation and sustainable development of the social economy, and increase employment and so on. After the project is put into operation, the original workers of small boiler rooms shall get a priority to work for the maintenance of new heating pipes and heat exchange substations and win re-employment training.

IV. The conclusion and key points of the environmental Impact Assessment

This project complies with the relevant industrial policies and state laws and regulations, the requirements of Hebei Province and Zhangjiakou City for economic and social development planning, the requirements of the World Bank for China and the relevant planning requirements of the local district. During the construction period, the project shall strictly follow the “three simultaneous” system and timely implement various environmental protection measures and management system proposed in this report. To this end, the impact on the environment shall be acceptable and it is feasible to construct the project from the environmental point of view.

V. The major matters of asking the public opinions:

1. The range of asking the public opinions:

To collect public comments and suggestions on the environmental impact, pollution prevention and environment protection.

2. The major matters of asking the opinions:

1) The existing environmental conditions of the Surrounding of the project? The major environmental problem?
2) What kind of impact will the construction of this project have on the environment? If such impact is within the acceptable range?
3) Whether or not support the construction of this project from the environmental point of view?
4) What are your suggestions of the environmental protection work of this project?
5) Other proposal?

VI. The methods and deadline for Public to access the environmental impact report

1. method of consulting

The environmental impact report is filed at Zhangjiakou City Dongyuan Heating Power Co., Ltd.

2. period of consulting

The Public may ask for the additional information of the project within 10 business days (from March 9, 2015 to March 20, 2015) 9:00 to 17:00, after the Public participated in the environmental information disclosure.

VII. Public Contact way:

Development unit: Zhangjiakou City Dongyuan Heating Power Co., Ltd.
Address: No. 9 Yangjiafenbeilu road, Qiaodong district, Zhangjiakou city
Postal code: 075000
Contact: Zhou Haizhen
Contact telephone: 0313-2113318
email：zjkdyrlgs@163.com

Environmental Impact Assessment agency: Zhangjiakou City Environmental Science Research Institute
Address: Environmental protection Mansion, No. 6 Weisan Road, Zhangjiakou city
Postal code: 010010
Contact: Shi Zheng
Tel: 4083086
email：zjkhky@163.com

Zhangjiakou City Dongyuan Heating Power Co., Ltd.
January 22, 2015

2. Questionnaire survey (Public opinion consultation)

Zhangjiakou sub-project conducted questionnaire survey twice. The first time shall be from Jan., 28, 2015 to Feb., 16, 2015 after the environment evaluation work plan completed. The questionnaire is designed to know the public awareness and understanding of the project, as well as their attitude towards the project and concerns about the environmental and social impact. The second time shall be from March, 19, 2015 to March, 28, 2015 after the environmental impact evaluation draft completed. It is also designed to collect public views, opinions and suggestions on the environmental impact and mitigation measures, understand their questions and concerns and incorporate them into the environment impact assessment at the preparation stage and into the preparation of the EIA report. A separate questionnaire designed for the subproject is adopted (please refer to **Table 11-31** and **Table 11-32** below for two questionnaire samples).

The questionnaire shall be released to residents and institutions along the pipeline and surrounding the heat exchange substations and pressure isolating heat exchange stations. There are 160 copies of questionnaire survey distributed and 147 valid questionnaire surveys returned in the first time questionnaire survey. There were 160 copies of questionnaire survey distributed and 146 valid questionnaire surveys returned in the second time questionnaire survey.

The results of questionnaire survey showed that about 95% of informants clearly support the project and nobody object it. For questionnaire survey results, please see **Table 11-33** "**Zhangjiakou sub-project - the summary of results of table for two rounds public consultation**.

Table 11-31-1 Zhangjiakou Sub Project - Public Participation in the Survey (the First Time Individuals)

Name		Gender	Male□ Female□	Age	≤30□ 31—50□ ＞50□		
Occupation	Civil servant □ worker □ teacher□ businessman □ student □ other □						
Education degree:	University or above □ Special technical secondary school or high school □ primary middle school or below □					National ity	

Address		Tel.	

Project introduction:

(1) Project name: "World Bank Financed Centralized Heating and Affordable Housing Supporting Facilities Project for Qiaodong District Zhangjiakou"

Implementing time: it is predict from 2015 -2018

Geographical position: Qiaodong district, Zhangjiakou City, Hebei Province

(2) Construction Party and Contact way:

Project development unit: Zhangjiakou City Dongyuan Heating Power Co., Ltd.

Contact: Zhou Haizhen

Tel：0313-2113318 email：zjkdyrlgs@163.com

(3) Environment evaluation Party and Contact way:

Environmental Impact Assessment agency: Zhangjiakou City Environmental Science Research Institute

Contact: Shi Zhen

Tel: 4083086 email：zjkhky@163.com

(4) Content of Construction and scale

1) A pressure isolating heat exchange station with a heating area of 3,880,000 m2 shall be constructed, which shall cover a construction area of 2,400m2 (including the schedule center) and a land area of about 2 mus.

2) Newly build zero-level, Level 1 hot water pipe network, the slot length is 20.5 Km.

3) Newly build and use small boiler room remould 58 heat sites; newly build 17 heat sites.

4) Utilize the present situation regional coal-fired boiler room remoulds 2 sets 70 MW gas hot water boiler.

5) Set up building Heat metering device in the existing 1340 residential buildings communities.

Environment evaluation work procedures and Main working contents:

Procedures for the environmental impact assessment: accept the commission – understand information on the project – seek for opinions of the relevant departments – have an environmental background investigation – monitor the current environmental quality – assess the environmental impact of noise, water, air, ecology and other factors – enable public participation – take project feasibility study and measures to relieve environmental impacts - prepare the project environmental impact assessment report. Main working contents will include:

(1) General provisions: it will incorporate the project origin, evaluation level, evaluation scope, evaluation criteria, environmental protection goals and other contents.

(2) Environmental policy, legal and regulatory framework and basis for preparation: it will cover the legal and regulatory basis of the proposed project, basis for preparation of reports, urban planning, air pollution control planning and environmental function zoning document, and analysis on the compliance of the proposed project with the relevant district policies and plans.

(3) Project description: it will analyze and explain the construction background, construction contents and construction methods of the project.

(4) Status of the surrounding environment quality: it will describe the natural and social environment and environment quality state surrounding the project (including air, surface water, ground water, sound).

(5) Predicted environmental impact assessment and environmental protection measures: it will analyze the impact of wastewater, waste gas, noise and solid waste on the surrounding environment during the project construction and operation.

(6) Analysis of alternatives: it will include the comparison of the "With Project" and "Without Project", comparison of heating alternatives, comparison of new heat exchange substation locations and comparison of heating network layout plans (pipeline alignment) and other contents.

(7) Environmental risk analysis and mitigation measures: it will cover the environmental risk identification, environmental risk impact analysis, environmental risk prevention and mitigation policies and measures.

(8) Analysis on land acquisition and relocation impact: it will analyze the reasonableness of the land acquisition and relocation plans, as well as the social impact.

(9) Public participation: it will collect public comments on the proposed project.

(10) Environmental management plan: it will cover the environmental management structure, environmental management training, environmental protection measures, environmental monitoring programs and other contents.

(11) Conclusions and recommendations: including a comprehensive evaluation conclusions and recommendations.

Please answer the following questions and tick the □ √if it is a qualified item, **and you may have multiple choices.**

1	Are you satisfied with the status quo of the local environment? □ satisfactory □ partially satisfied □ not satisfied
2	Which of the following you think is the local environmental issue at present? □ Air pollution □ water pollution □ noise nuisance □ solid waste pollution □ deterioration of the ecological environment.
3	Do you know about this project? □ no □ a little bit □ yes
4	What impact do you think this project may have on the environment? □ Air pollution □ water pollution □ noise nuisance □ solid waste pollution □ deterioration of the ecological environment.

5	Do you accept the environmental impact of this project? □ acceptable □ not acceptable □ indifferent attitude
6	What do you think of the impact of environmental conditions to you and your unit after the project completed? □ beneficial effect □ Adverse effect □ no effect
7	Do you support the construction of the project? □ support □ indifferent attitude □ objection Please explain if object it:
8	What's your suggestion and requirement for the environment protection during and after the construction of the project?

Table 11-31-2 Zhangjiakou Sub Project - Public Participation in the Survey (the First Time, Institutions)

Name:	Age:	Gender:	Business:
Unit Name:		Contact way:	
Suggestions and comments of the project: Unit (Official Seal): Date: M D Y			

Table 11-32-1 Zhangjiakou Sub Project - Public Participation in the Survey (the Second Time Individuals)

Name		Gender	Male□ Female□	Age	≤30□ 31-50□ ＞50□
Occupation	Cadre □ worker and clerk □ peasant □ student□ other□				
Type of unit	Enterprise □ Institutions □ government agency □ other□				
Education degree:	University or above □ Special technical secondary school or high school □ primary middle school or below □				
Address				Tel.	

Project introduction:

The World Bank Financed Centralized Heating and Affordable Housing Supporting Facilities Project for Qiaodong District Zhangjiakou (hereinafter referred to as the "Project") are proposed to be implemented by Zhangjiakou Dongyuan Heating Co., Ltd. with loans from the World Bank. It intends to replace the heat source from the existing scattered coal-fired small boilers in Qiaodong District with the cogeneration heat source from Zhangjiakou Power Plant and transfer the existing two coal-fired boilers to gas-fired boilers to increase the energy efficiency, reduce air pollution and greenhouse gas emissions and improve the ecological environment.

The Project shall consist of five sub-projects located in Qiaodong District Zhangjiakou. Please refer to the right map for their specific locations. Content of Construction and scale of the sub-projects are as follows:

1) A pressure isolating heat exchange station with a heating area of 3,880,000 m2 shall be constructed, which shall cover a construction area of 2016m^2 (including the schedule center) and a land area of about 2.84 mus.

(2) Newly build zero-level, Level 1 hot water pipe network, the slot length is 20.5 Km.

(3) Newly build and use small boiler room remould 58 heat sites; newly build 17 heat sites.

(4) Utilize the present situation regional coal-fired boiler room remoulds 2 sets 70 MW gas hot water boiler.

(5) Set up building Heat metering device in the existing 1340 residential buildings communities.

Impact and measures to the ecology environment

(1) Construction period

1. Exhaust gas: Air pollution source are mainly from construction machinery exhaust gas and dust;
2. Waste water: water pollution includes the sewage of the construction team, equipment washing water in the construction area and pipe pressure test wastewater. All wastewater shall be discharged into the nearest municipal sewage pipe network;
3. Noise: the sound impact on the environment is mainly from the construction machinery and equipment. Due to high noise intensity within the construction site, nearby residents will be inevitably impacted;
4. Solid Waste: the solid waste is mainly from the construction waste (including residual soil) and a small amount of household garbage. Among them, the former shall be transported to designated locations for landfill, while the later shall be removed by the sanitation sector.
5. Ecology: trench excavation and temporary land occupation for laying will damage to the structure and physical properties of the soil, while dusts generated will adversely impact the vegetation along the road.

Through improvements in the construction management, scientific and standardized construction, and strict implementation of relevant laws and regulations in Hebei Province and of appropriate measures can effectively relieve the environmental impact during the

construction period. 175 Thus, the impact to the surrounding environment during the construction period is acceptable.

(2) Operation period

1. Exhaust gas: the implementation of the project for the Environment has significant positive benefits. In addition, the centralized heating can improve the thermal efficiency, reduce energy consumption, reduce air pollutants and greenhouse gas emissions and finally improve the local air quality;
2. Waste water: the waste water during operating period is mainly from regular washing of the softening water system (using ion-exchange resin) and wastewater generated by resin regeneration, as well as swage generated by on-duty operators. After pretreatment at the septic tank, the waste water will be discharged into the municipal sewer network and eventually enter into the sewage treatment plant in main urban area of Zhangjiakou to meet the relevant standards;
3. Noise: as the noise at the pressure isolating heat exchange station is mainly from the circulating pump and making-up pump and the noise at the gas-fired boiler is mainly from burners and blowers, effective damping, sound insulation and other measures may significantly reduce impact on the surrounding environment.
4. Solid waste: solid waste is mainly from on-duty operators, which is expected to be 0.75t/a and periodically removed by the sanitation department.

Impact and measures to the social environment

No rural collective land shall be expropriated in the project. The project does not involve the rural collective land housing demolition and only needs a small amount of state-owned land. During the construction period, the adverse social and environmental impacts may include local traffic congestion and transmission of diseases among immigrant construction workers, while positive effect may include the prosperity of the local market and increase in local employment. 186

After putting into operation, the negative impact shall be replaced by re-employment of long-term staff of small boiler rooms. In terms of the positive impact, the project will improve the stability of heat supply and residents' health level, promote energy conservation and sustainable development of the social economy, and increase employment and so on. After the project is put into operation, the original workers of small boiler rooms shall get a priority to work for the maintenance of new heating pipes and heat exchange substations and win re-employment training.

Please answer the following questions and tick the □ √if it is a qualified item, and you may have multiple choices.	
1	How do you know the news of the upcoming construction of the project? □ broadcast □ newspaper □ network □ TV □ other
2	Are you satisfied with the current heating situation in the residential area? □ very satisfied □ satisfactory □ partially satisfied □ not satisfied (please explain the reasons:)
3	In your opinion, will the Project be beneficial for the local heating conditions and economic development? □ improve the life gas using status □ In favor of land development and utilization in the pipe network coverage area □ To promote the economic development of the city □ Little effect □ don't know
4	Do you think that the site selection of the heating station and heating line of the project is reasonable? □ reasonable □ Basic reasonable □ unreasonable the unreasonable part is：)
5	Do you accept the environmental impact of this project? □ acceptable □ It shall be accepted after taking the environmental protection measures □ can be accepted, it is difficult to accept (please tell the reason:)
6	What are your attitudes towards and requirements for environmental protection measures to be taken during the construction period of the Project? □ Endorse and satisfaction □ still need to improve and strengthen (specific comments as follows:) □ indifferent attitude
7	What are your attitudes towards and requirements for environmental protection measures to be taken during the operating period of the Project? □ Endorse and satisfaction □ still need to improve and strengthen (specific comments as follows:) □ indifferent attitude
8	Do you support the construction of the project? □ support □ conditional support (please specify the reason(s)：) □ indifferent attitude □ does not support(please specify the reason(s)：)
9	Any specific recommendations and requirements for the project?

Table 11-32-2 Zhangjiakou Sub Project - Public Participation in the Survey (the first 2 times)

Contact			
Unit/Community Name (Seal)			
Unit/community address		Tel.	
Project introduction:			

The World Bank Financed Centralized Heating and Affordable Housing Supporting Facilities Project for Qiaodong District Zhangjiakou (hereinafter referred to as the "Project") are proposed to be implemented by Zhangjiakou Dongyuan Heating Co., Ltd. with loans from the World Bank. It intends to replace the heat source from the existing scattered coal-fired small boilers in Qiaodong District with the cogeneration heat source from Zhangjiakou Power Plant and transfer the existing two coal-fired boilers to gas-fired boilers to increase the energy efficiency, reduce air pollution and greenhouse gas emissions and improve the ecological environment.

The Project shall consist of five sub-projects located in Qiaodong District Zhangjiakou. Please refer to the right map for their specific locations. Content of Construction and scale of the sub-projects are as follows:

1) A pressure isolating heat exchange station with a heating area of 3,880,000 m2 shall be constructed, which shall cover a construction area of 2016m^2 (including the schedule center) and a land area of about 2.84 mus.

(2) Newly build zero-level, Level 1 hot water pipe network, the slot length is 20.5 Km.

(3) Newly build and use small boiler room remould 58 heat sites; newly build 17 heat sites.

(4) Utilize the present situation regional coal-fired boiler room remoulds 2 sets 70 MW gas hot water boiler.

(5) Set up building Heat metering device in the existing 1340 residential buildings communities.

Impact and measures to the ecology environment

(1) Construction period

1. Exhaust gas: Air pollution source are mainly from construction machinery exhaust gas and dust;
2. Waste water: water pollution includes the sewage of the construction team, equipment washing water in the construction area and pipe pressure test wastewater. All wastewater shall be discharged into the nearest municipal sewage pipe network;
3. Solid Waste: the solid waste is mainly from the construction waste (including residual soil) and a small amount of household garbage. Among them, the former shall be transported to designated locations for landfill, while the later shall be removed by the sanitation sector.
4. Ecology: trench excavation and temporary land occupation for laying will damage to the structure and physical properties of the soil, while dusts generated will adversely impact the vegetation along the road.

Thus, the impact to the surrounding environment during the construction period is acceptable.

(2) Operation period

1. Exhaust gas: the implementation of the project for the Environment has significant positive benefits. In addition, the centralized heating can improve the thermal efficiency, reduce energy consumption, reduce air pollutants and greenhouse gas emissions and finally improve the local air quality;
2. Waste water: the waste water during operating period is mainly from regular washing of the softening water system (using ion-exchange resin) and wastewater generated by resin regeneration, as well as swage generated by on-duty operators. After pretreatment at the septic tank, the waste water will be discharged into the municipal sewer network and eventually enter into the sewage treatment plant in main urban area of Zhangjiakou to meet the relevant standards;
3. Noise: as the noise at the pressure isolating heat exchange station is mainly from the circulating pump and making-up pump and the noise at the gas-fired boiler is mainly from burners and blowers, effective damping, sound insulation and other measures may significantly reduce impact on the surrounding environment.
4. Solid waste: solid waste is mainly from on-duty operators, which is expected to be 0.75t/a and periodically removed by the sanitation department.

Impact, countermeasures and measures to the social environment:

No rural collective land shall be expropriated in the project. The project does not involve the rural collective land housing demolition and only needs a small amount of state-owned land. During the construction period, the adverse social and environmental impacts may include local traffic congestion and transmission of diseases among immigrant construction workers, while positive effect may include the prosperity of the local market and increase in local employment. Effective construction management and scientific arrangement of construction can effectively reduce the negative impact. In addition, the impact during the construction period will be temporary and may disappear after the construction.

After putting into operation, the negative impact shall be replaced by re-employment of long-term staff of small boiler rooms. 188 After the project is put into operation, the original workers of small boiler rooms shall get a priority to work for the maintenance of new heating pipes and heat exchange substations and win re-employment training.

Please answer the following questions and tick the □ √if it is a qualified item, and you may have multiple choices.

1	How does your unit know the news of the upcoming construction of the project? □ broadcast □ newspaper □ network □ TV □ other
2	Is your unit satisfied with the current heating situation in the residential area? □ very satisfied □ satisfactory □ partially satisfied □ not satisfied (please explain the reasons:)
3	In your unit's opinion, will the Project be beneficial for the local heating conditions and economic development? □ improve the life gas using status □ In favor of land development and utilization in the pipe network coverage area □ To promote the economic development of the city □ Little effect □ don't know
4	Does your unit think that the site selection of the heating station and heating line of the project is reasonable?

	□ reasonable □ Basic reasonable □ unreasonable(the unreasonable part is：)
5	Does your unit accept the environmental impact of this project? □ acceptable □ It shall be accepted after taking the environmental protection measures □ it is difficult to accepted (please tell the reason:)
6	What is the attitude of your unit towards and requirements for environmental protection measures to be taken during the construction period of the Project? □ Endorse and satisfaction □ still need to improve and strengthen (specific comments as follows:) □ indifferent attitude
7	What are your attitudes towards and requirements for environmental protection measures to be taken during the operating period of the Project? □ Endorse and satisfaction □ still need to improve and strengthen (specific comments as follows:) □ indifferent attitude
8	Will your Unit support the construction of the project? □ support □ conditional support (please give reason(s)：) □ indifferent attitude □ does not support(please give reason(s)：)
9	Any specific recommendations and requirements for the project else from your unit?

3. Interviews

The construction unit, together with the Environment Impact Assessment unit has conducted three interview activities for the sub-project of Zhangjiakou successively. In the first time that lasted from January 28 to February 16 in 2015 after the completion of the outline of EIA work, Chahar market, Guanyu Electronics Company, Jinbo Trading Company, Wenlida Stationery Shop, Center for Disease Prevention and Control of Qiaodong District, Health Supervision Agency of Qiaodong District, the District Food and Drug Administration and other 20 enterprises and institutions within the region of the project were visited. In the second time that lasted from March 19 to March 28 in 2015 after the completion of the 1st draft of EIA report, the Hongqilou Street, Wuyi Road Street, Shengli Road Street and other 26 community residents' community were visited. The third interview was conducted on April 21, 2015 during the period of improving the EIA report and the Traffic Police Detachment of Zhangjiakou City was interviewed for the traffic impact during construction. Please refer to **Table 11-33** "Sub-project of Zhangjiakou—Summary Statement of the Situations and Results of Two Rounds of Public Consultation Activities" for details and results of the three interview activities.

4. Public Consultation Meetings

Two rounds of public consultation meetings have been conducted for the sub-project of Zhangjiakou. The first round with two meetings was held after the completion of the outline of EIA work, and the second round was after the completion of the 1st draft of EIA report with three meetings.

Two meetings in the first round were held on Jan. 28, 2015 and Jan. 29, 2015 respectively. One was targeted at various government agencies departments, social institutions and other related institutions and the participants included the Government Office, the Development and Reform Commission, the Land Bureau, the Environmental Protection Bureau, Health Bureau, Human Resources and Social Security Bureau, the Women's Federation, the Municipal Engineering Administration Department, Bureau of Civil Affairs of Qiaodong District and other agencies. In the meeting, the following were presented and discussed: the current situation of economic and social development, urban development planning and central heating planning, local land (temporary and permanent land acquisition) compensation policy, current central heating scope and demand conditions as well as fuel usage of Qiaodong District; understand the attitudes and opinions of relevant units for the construction of the sub-project and assistance that can be provided during project implementation; and learn the operation, charging, management, development planning, etc. of the thermo-technology company. The other was mainly for residents and hospitals, schools and other related institutions and the participants included Fu'an

Street Community, Deshengli Community, Kaiheng Property, 251st Hospital, Department of Education, Wansheng Property, Hanqiao North Community, Nankou Community, Tielu Community and representatives of heating plant of Dongyuan Heating Company. In the meeting, the following issues were presented and discussed: the social benefits and negative impacts of the implementation of the project on the surrounding environment as well as ways, measures, etc. to eliminate or mitigate the negative effects; the project location and influence scope of the project; and learn the level of understanding of the project, attitudes to the project, willingness for compensation, etc. of the participants.

Three meetings in the second round were held on March 19, 2015, March 20, 2015 and April 24, 2015 respectively. The first one was also targeted at various government agencies departments, social institutions and other related institutions and the participants included the Government Office, the Development and Reform Commission, the Land Bureau, the Environmental Protection Bureau, Health Bureau, Human Resources and Social Security Bureau, the Women's Federation, the Municipal Engineering Administration Department, Bureau of Civil Affairs of Qiaodong District and other agencies. The following issues were discussed in the meeting: the environmental impact of the project, the environmental impact mitigation measures, comments and suggestions of the environmental mitigation measures of the participants, how to reflect the reasonable comments and suggestions of the agencies in the EIA report, etc.

The second meeting was still mainly for community streets and the participants included resident representatives and people in charge of relevant community committees of Hongqilou Street, Wuyi Road Street and Shengli Road Street of Qiaodong District. The meeting was held to consult the resident representatives' comments and suggestions on the environmental impact of the project and mitigation measures. The third one was a symposium, which mainly discussed the rationality and effectiveness of mitigation measures of special effects during construction developed, such as: traffic control, avoiding pipeline interference, etc. The participants were from the natural gas, electricity, Netcom, traffic police, landscaping and other 8 regulatory agencies and enterprises. In addition, personnel of the construction unit and the EIA unit also participated in the meeting.

For details and results of five public consultation meetings, please refer to **Table 11-33 "Sub-project of Zhangjiakou—Summary Statement of the Situations and Results of Two Rounds of Public Consultation Activities".**

5. Summary of the Public Consultation Activities

For summary of details and results of two rounds of public consultation activities of the sub-project of Zhangjiakou, please refer to **Table 11-33.**

Table 11-33 Sub-project of Zhangjiakou—Summary Table of the Situations and Results of Two Rounds of Public Consultation Activities

Round	Date (2015)	Place	Participants	Method and Main Contents	Major Issues Related Parties are Concerned About		Methods and Results of Handling the Issues Concerned
1st Round	Jan. 28	Conference Room of Government Service Center of Qiaodong District, Zhangjiakou City	5 personnel of the EIA group, 9 personnel of the Government Office, the Development and Reform Commission, the Land Bureau, the Environmental Protection Bureau, Health Bureau, Human Resources and Social Security Bureau, the Women's Federation, the Municipal Engineering Administration Department, Bureau of Civil Affairs, etc. of Qiaodong District	Workshop: the investigation team will understand the current situation of economic and social development, urban development planning and central heating planning, local land (temporary and permanent land acquisition) compensation policy and further learn about the attitudes and opinions of relevant units to the project and assistance that can be provided during project implementation, current central heating scope and demand conditions as well as fuel usage of Qiaodong District; and know about the operation, charging, management, development planning, etc. of the heat company.	The Government Office of Qiaodong District	The project would alleviate the lack of district heating source and improve air quality. Out unit would strongly support the project.	EIA institute will give related comment feedback to the project implementation unit and relevant government agencies. The project implementation unit promises to develop a reasonable construction plan to fully ensure the normal production and life of residents and the construction and operation will be in accordance with relevant laws, regulations and policies. Meanwhile, it will implement environmental management and impact mitigation measures of EMP strictly to guarantee that the environment impact during construction is within acceptable limits. The construction unit gives a detailed description of environmental control measures such as noise, dust, solid waste, etc. to the government agency, with which the latter is satisfied and it will assist in the smooth development of the project.
					Qiaodong Branch of the Land Bureau	1) Strongly support the project; 2) try not to affect residents' travel and transportation in the process of construction; 3) avoid noise nuisance during construction.	
					Qiaodong Branch of the Environmental Protection Bureau	1) Strengthen environment management during construction and prohibit mechnical construction during 22:00-6:00 in the night and 12:00-14:00 in the noon; 2) emphasize dust suppression and water the dust timely; 3) transport the construction waste to designated place or backfill and pavement instead of dumping, spilling or piling randomly during construction; 4) place the heat transfer station and other noise-generating device in closed device room and take measures to reduce the noise to ensure it meets the standards.	
					Health Bureau of Qiaodong District	Our unit would fully support the people-benefiting project; reduce waste piling, decrease air pollution, and pay attention to the time of construction and regulate the traffic actively.	
					Human Resources and Social Security Bureau of Qiaodong	Provide insurance to the front-line staff; ensure the payment of wages of the migrant workers and avoid labor disputes. Support district heating transformation of our district.	

					District		
					The Development and Reform Commission of Qiaodong District	Remove the construction waste; emphasize dust suppression and traffic control; and improve the project approval procedures.	
					The Women's Federation of Qiaodong District	Suggest the implementation of dust suppression measures, clean up the muck promptly so as not to affect residents' lives. The Women's Federation strongly supports the project construction and cooperates actively in publicity.	
					the Municipal Engineering Administration Department of Qiaodong District	The project, aiming at improving the air quality and eliminating backward heating mode, has both economic and social benefits, so it should be fully supported. The pipeline laying centralized on the trunk roads, so the construction party should pay attention to the operation safety of the original water, electricity, rain and other underground pipelines, urban flood control safety, congestion and other impacts. It is suggested to be constructed by highly specialized construction team to ensure both the quality and quantity.	
	Jan. 29	Conference Room of Zhangjiakou Dongyuan Heating Co., Ltd.	10 personnel from Fu'an Street Community, Deshengli Community, Kaiheng Property, No. 251 Hospital, Department of Education,	Workshop: the investigation group learnt about the level of understanding, attitudes, willingness for compensation of the project of the participants; the social benefits and negative impacts of the project implementation on the	1) Complete the construction within the period with ensured quality and quantity. 2) Control the noise, clean up the construction wastes and solid waste and restore the road after the end of construction as soon as possible. 3) Seek the views of residents several times before construction to stop the nuisance to them and pay attention to the travel safety of the students and teachers of the school during construction.		The construction unit offers a detailed introduction to the progress of the project and centralized heating will be realized after implementation. It will develop *the Traffic Security Program* with the police department of Qiaodong District before construction to ensure the normal

			Wansheng Property, Hanqiao North Community, Nankou Community, Tielu Community and Zhangjiakou heating plant	surrounding environment, ways, measures, etc. to eliminate or mitigate the negative impacts. The investigation group also confirmed the project location and scope of project influence.	4) Ensure the heating temperature. As a livelihood project, it is beneficial both to the country and people and it can reduce the emissions of smoke and other air pollutants, so all participants present would be in full support of the project construction.	operation of traffic. The construction unit will strictly enforce the public participation plan during construction of EMP to ensure that the public know about the project schedule. The public have also expressed their understanding and support.
	Jan.28-Feb.16	Household visit	Enterprises and institutions including Chahar market, Guanyu Electronics Company, Jinbo Trading Company, Wenlida Stationery Shop, Center for Disease Prevention and Control of Qiaodong District, Health Supervision Agency of Qiaodong District, the District Food and Drug Administration, etc.	Interview: the investigation group will visit the enterprises and institutions affected by the project construction and operation and introduce project profile and environmental impact to them. Opinions and suggestions of related personnel in charge of the enterprises and institutions will be solicited.	1) Reduce the impact on the interests of the commercial tenants. 2) Try not to affect the normal life of the residents and take measures to control noise and dust. 3) Prepare pre-project planning and ensure the normal supply of the residents and enterprises of the project area. 4) All interviewees support the construction and implementation of the project as soon as possible.	The construction unit hopes to takes the measures, such as optimizing the pipeline trends, avoiding the businesses, constructing in sections and semi-enclosed, etc. to reduce the operational impact on the enterprises and institutions. Related enterprises and institutions have expressed their understanding and support.
	Jan.28-Feb.16	Field and household or Visit	160 residents around the construction pipelines, thermal stations and vibration pressure heat transfer stations	Questionnaires: questionnaires are distributed to residents affected by the project to understand their level of awareness and understanding of the project as well as their attitudes to the project and their concerns about relevant environmental and social	1) 44% of the people are satisfied with the local environment status; 30% are relatively satisfied and 26% are dissatisfied. 2) 29% think the existing environmental problem is air pollution; 30% think it is noise; 22% think it is solid waste; 12% think it is water pollution and 7% think it is the deterioration of the ecological environment. 3) 36% know about the project; 41% have slight understanding and 23% know nothing about it. 4) 30% think the project will cause air pollution; 45% think it is noise	EIA unit introduces that the emissions of the pollutants meet the standards to reduce the environmental impact as low as possible. In addition, the construction unit has set up a complaint and feedback mechanism that can solve the problem of environmental impact in

				impacts. In all, 160 questionnaires are distributed and 147 valid are returned.	pollution; 9% think it is solid waster pollution; 8% think it is water pollution and 8% think it is the deterioration of the ecological environment. 5) 66% think the environmental impact of the project is acceptable; 26% are not concerned about it and 8% consider it unacceptable. 6) 46% hold the environmental impact after the completion of the project is beneficial; 45% say it has no impact and 9% think it is adverse impact. 7) 78% are in favor of the project; 22% do not care and no one objects to it. 8) Suggestions: plant more trees, control the noise, dust, sewage and other pollution.	the process of project implementation quickly and effectively. After explanation, the public have expressed their understanding and support.
2nd Round	March 19	Conference Room of Government Service Center of Qiaodong District, Zhangjiakou City	Government Office, the Development and Reform Commission, the Land Bureau, the Environmental Protection Bureau, Health Bureau, Human Resources and Social Security Bureau, the Women's Federation, the Municipal Engineering Administration Department, Bureau of Civil Affairs of Qiaodong District	Workshop: EIA unit introduces the major sources and forecasts of pollution to related government agencies according to the environmental impact report with the construction unit and it also illustrates the control measures of pollution in details. The opinions and suggestions of the government will be reported to relevant authorities and timely feedback will be offered while giving consideration in the report.	It has expressed full support for this project and will assist the project in improving project approval, planning and other procedures as soon as possible. Hope to start as quickly as possible so that residents of Qiaodong District, Zhangjiakou City can enjoy the conveniences and services of centralized heating promptly.	The construction unit hopes to complete the formalities as soon as possible so that the project can be completed early. Meanwhile, the environmental management and impact mitigation measures of EMP will be strictly enforced to minimize the environmental impact. And the government unit has expressed satisfaction with it.
	March 20	Multi-purpose Hall on the 4th Floor of Yingbin	resident representatives and people in charge of relevant community committees of	Workshop: ELA unit and the construction unit consult the public of the environmental impact report and their opinions and suggestions are reflected to	All participants have expressed support for this project and hope to start and complete the project as soon as possible. Improve the air quality of Qiaodong District, increase heating stability and temperature. No rise in heating costs.	The construction unit says it will complete the project as early as possible and give 500Yuan to each poor family as the pipeline network transformation subsidy. And

		Hotel, Zhangjiakou City	Hongqilou Street, Wuyi Road Street, Shengli Road Street, etc.	related authorities timely feedback will be offered while giving consideration in the report.		installment payment is allowed for families with difficulties with government subsidies. Meanwhile, the environmental management and impact mitigation measures of EMP will be strictly enforced to minimize the environmental impact. And the residents of the communities have expressed satisfaction with it.
	March 19-March 28	Door-to-Door Visit	Hongqilou Street, Wuyi Road Street and Shengli Road Street and other 26 community committees	Interview: the interview group has visited the community committees influenced by the project construction and operation and introduced the project profile and environmental impact to them. It also seeks the opinions and suggestions of people in charge of the community committees.	Each community leader has expressed support for the project and said attention should be paid to pollution control and implementation of environmental protection measures. The normal travel and daily lives should be particularly guaranteed.	The construction unit will enforce the environmental protection measures and improve various formalities as soon as possible and strive for early completion of the project. Meanwhile, the environmental management and impact mitigation measures of EMP will be strictly enforced to minimize the environmental impact. And the interviewees have expressed satisfaction with it.
	March 19-March 28	Field and Door-to-Door Visit	160 residents around the construction pipelines, thermal stations and vibration pressure heat transfer stations	Interview: questionnaires on the environmental influence report are distributed to residents around the vibration pressure heat transfer stations, thermal pipelines, etc. by the construction unit and their opinions and suggestions are reflected to related authorities and timely feedback is offered while giving consideration in the	1) 71% of the people know about the project through other channels; 10% through the newspapers; 7% through the Internet; 10% through the television; and 2% through the broadcast. 2) 20% are very satisfied with the current heating situation; 39% are satisfied; 20% are relatively satisfied and 21% are dissatisfied. 3) 49% think that the implementation of the project can improve the situation of gas used for lives; 36% think it will promote the development of economy; 12% think it is conducive to the land development of the area covered by the pipeline networks; 1% think it is of little help; and 2% are not clear. 4) 68% think the location selection of the thermal stations and heating	EIA unit will be in strict accordance with the environment mitigation measures of the environment management planning of the project to ensure the environmental impact is mitigated to an acceptable level. The public are satisfied with it.

				report. In all, 160 questionnaires are distributed and 146 valid are returned.	pipelines is reasonable; 31% think it basically reasonable; and 1% think it unreasonable. 5) 51% consider the environmental impact of the project acceptable; 48% think it acceptable under the premise of taking environmental protection measures; and 1% think it hard to accept. 6) 88% are in favor of and satisfied with the environmental protection measures during construction of the project; 7% hold it needs to be improved and strengthened; and 5% think it does not matter. 7) 88% are in favor of and satisfied with the environmental protection measures during operation of the project; 7% hold it needs to be improved and strengthened; and 5% think it does not matter. 8) 95% support the construction of the project; 2% do not care; 3% support with conditions (controlling environment and noise pollution) ; and no one objects to it. 9) Suggestions and requirements: ensure quality, eliminate noise without disturbing the residents, not raise the heating costs and reduce the impact of dust and waste.	
	April 21, 2015	Order Section of the Traffic Police Detachment of Zhangjiakou City	5 personnel from EIA working group and the construction unit; management leaders of the Traffic Police Detachment of Zhangjiakou City	Interview: the construction unit describes the project background to relevant management departments of the traffic police detachment, understands the traffic conditions and listens to the opinions and requirements of the management department for roads with great traffic pressure.	The leaders of the traffic police detachment say that coordinating meeting will be held before starting construction and our bureau will develop the program of traffic management and be responsible for controlling the traffic. Construction will be conducted in sections to ensure the normal operation of the traffic. Our bureau will actively cooperate to carry out the project.	EIA unit has summarized the traffic management measures and incorporated them into the chapter of control measures of environmental impact. The construction unit will obey the arrangement of the traffic police detachment to reduce the traffic impact and arrange special personnel to assist. The interviewees are satisfied with it.
	April 24, 2015	Conference Room of Zhangjiakou Dongyuan Heating	5 personnel from EIA working group and the construction unit; 8 units including the natural gas, power supply, Netcom, traffic	Workshop: focus on understanding the traffic conditions and depth, location, status and time of burying of underground pipes and listens to the opinions and requirements	All participants are in support of the project. The depth of management pipelines of each is unit is about 1-2m without planning or adjustment recently. Each unit requires holding coordinating meetings before construction to determine the location of excavation and avoid underground pipelines. When coming across the green belt, application to the landscaping unit is required. And the traffic police department	The construction unit will observe *the Environmental Management Procedures of the Construction Activities of Laying Pipelines* developed in the report strictly. The coordinating meeting will be held

		Co., Ltd.	police, landscaping, etc.	of the management department for roads with great traffic pressure. And listen to the requirements, measures and suggestions of the management unit for the underground pipelines and communicate the issues of their concern.	requires the construction unit to comply with the traffic management program.	after the completion of developing the preliminary construction program to solicit the opinions of various units. And it shall not destroy the underground pipeline network facilities and the green belt needs to be restored if destroyed. The construction unit will enforce the traffic management program strictly and adopt the measures such as construction in sections, semi-close of the roads, guiding signs, etc. to mitigate traffic impact. The interviewees are satisfied with it.

6. Analysis of Social Evaluation

In terms of the sub-project “social evaluation”, the public participated in consulting activities through the way of literature researches, focus groups’ discussions, households observations, participant observation and questionnaire surveys. Through these activities, people in the project area gained relatively comprehensive information of the project. In addition, they also expressed their attitudes and needs for the project, from which the construction unit understood demands of various stakeholders so that their suggestions could be considered and used in the preparatory stage of the project. Conditions of commentary public consultation and information distribution activities can be seen in **Table 11-34**.

Table 11-34 Zhangjiakou Sub-project- Commentary Public Consultation and Information Publish Activity Conditions

Date (2014)	Site	Participator	Way and main contents	Main concerns of beneficial parties	Treatment method and results of concerns
October 8th to 19th	Qiaodong district government agency's web site and other related websites	Editorial working team members include six people. 16 people come from Zhangjiakou Bureau of Civil Affairs, Bureau of Public Utilities, Human Resources And Social Security Bureau, Poverty Relief Office, Bureau of Housing and Urban, Statistical Bureau, National Administration of Religious Affairs, the Women's Federation, Environmental Protection Agency, Development and Reform Bureau, Heating Companies and Qiaodong District Government.	Website inquiries. Refer to documentation of relevant units.	In order to better carry out the social impact analysis, editorial working team members collect a large amount of data from web sites of related units, including economic and social development statistical materials of the street, district, city and province; the data information and research literature on poverty, social sex, energy consumption and atmospheric environment.	The editorial working team collected relevant information of social impacts of the project, which can provide information sources for better report preparations.
October 8th to 9th, December 23rd to 24th	1. Residents symposium: 12 residents symposiums were held in south community of worker villages, south community of the red flag building, Nankou community, Tuergou community, Yuershan community and Malujie community. 2. Institutions symposium: Three institutions symposiums were held.	12 resident symposiums with 162 residents-time participated were held, among them, 101 women, 32 impoverished people and 20 people of national minorities participated in them. There were three institutions symposiums with 18 participating institutions and 39 persons. Four owners and workers symposiums of the boiler room were planned to be closed. 31 people participated in them. There were 31 people there. In addition, six people came from the editorial working team and three people	Focus group discussion; social-economic development status of the project area;residents' evaluation to small coal-fired boilers and centralized heating modes; positive influences and negative influences to be brought by the project; different groups' attitudes, demands, comments and Suggestions of the project; workers' job placement problem of the boiler room was planned to be closed.	1. Hope that the project can be done as soon as possible; 2. Support the conduction of household heat-control metering charge method; 3. Hope to improve the quality of heating supply; 4. Some seasonal workers want the government to provide employment information and some workers want the government to provide technical training; 5. Some workers working for a long time wants to work in the heating company after the completion of the project; 6. Hope project construction process can be done smoothly;	Dongyuan heating companies can provide 200 to 300 temporary posts during the project construction phase and can provide some stable jobs, such as maintenance man, customer service staff and cleaners. Boiler men affected by the closing of the boiler room shall be given priority. The construction units said that it would give RMB 500 Yuan to each needy family as the pipe network reconstruction expense subsidy. If the life of families are still difficult after enjoying government subsidies, the installment payment method will be used. The construction unit said that they would develop appropriate measures according to opinions of the grassroots so as to win their understanding and satisfaction.

	3. The boiler room owners and workers symposiums are planned to be closed: Three symposiums were held in Nankou community, Yuershan community and the red flag south community and one symposium was held in the boiler room of Dongyuan heating company.	came from the sub-project office.		7. Owners and construction units are suggested to communicate with residents and units affected so as to avoid contradictions and conflicts; 8. The government is suggested to continue the policy a few years ago and to transform secondary piping network of needy families and to conduct the household heat reconstruction expense subsidy policy. The heating company is suggested to use the installment payment method to most needy families.	
October 10th to 11th; December, 25th	Small shops and slap-bang shops along the street and enterprises and public institutions	There are six members of the editorial working team and three people of the sub-project office. 75 people are interviewed, including workers of small shops and slap-bang shops along the street, residents met in the questionnaire survey process; responsible persons of industrial and commercial enterprises and public institutions; community working staff; owners of the boiler room and boiler men.	Depth interview; Livelihood patterns, current heating situations of the local people and likely impacts of the project; situations of the number of impoverished people, women and minority nationalities and project's effects on them; livelihood status of the boiler man and the project's effect on them; attitudes and demands of affected groups on the construction projects.	1. Hope that the owner can do well the construction program and reduce the inconvenience to people during their traveling. The security of primary and middle school students on their way to and back school shall be especially guaranteed; 2. Hope that appropriate measures can be taken to reduce influences of construction noises and raise dusts on normal life of surrounding residents; 3. Shop owners hope that pipe networks can be laid when sections and time are divided so as to reduce their influences to retail shops as far as possible.	During the personal interview, editorial working team members described contents and expected purposes of the project to the mass in detail. The mass in the project area gained more comprehensive information. In addition, the editorial working team members also positive influences and negative influences of the project may be brought to residents, listened to comments and suggestions of the residents. The construction unit would optimize the construction scheme and reduced environmental influences on public institutions.
October 10th to 11th; December, 25th	Zhangjiakou Dongyuan Heating Power Co., LTD	Six members of the editorial working team and three people from the sub-project office	Participant observation; social life of the masses in the project area; heat supply effect of the coal-fired boiler and their effect on environment;	Social assessment staff gets familiar with the socioeconomic status of the project area and the project construction situations. The investigator asked situations of the Building 15 of the May Day Backstreet, family dormitory	Through the participant observation, investigators know more about social lives of the project area, heating situations of the project area, environmental pollution brought the usage of the coal-fired boiler and the living and working conditions of the boiler

			central heating effect; land occupation of construction sites of intervals pressure heat exchange stations	buildings of Zhangjiakou Public Utility Authority, family dormitory buildings of Xinhua Bookstore, New 7th middle school, Zhangjiakou Jianguo Hospital and boiler rooms of Dongyuan heating company, boiler rooms of Hengkai property management company in Fuan street, the boiler room for family dormitory buildings of the Public Prosecutor's Office.	men.
October 10th to 11th; Decembe r, 25th	On-site visit along the project lines	Six editorial working team members, five investigators and 150 resident household of the project area.	Questionnaire for; basic social and economic situations of family households in the project area; housing and heating conditions of family households in the project area; attitudes and suggestions of the groupd to the construction of the project; willingness to pay and the ability to pay of the masses	140 informants know usage of the project; 52.6% of them said that they knew it from social investigators; 32.3% of them said that they heard from others. They hope that the construction unit can make the construction plan in advance so as to reduce their influences on lives of residents as far as possible. Questionnaire survey results show that 100.0% of the respondents support the project construction; 99.3% of the masses consider that this project is very important or more important. Only 0.7% of the people think that it is not very important.	Owners and government departments are suggested to advertise the project strongly, particularly via television, newspaper and other approaches, so as to guarantee the groupd's right to be informed and their participation rights. The construction unit shows that it will strengthen publicity and the feedback strength, will reasonably arrange the construction plan and will take management measures during the construction period to minimize environmental impacts. Those surveyed said they can understand and support the project.

7. A Brief Summary

Through two rounds of public engagement activities of Zhangjiakou sub-project, local stakeholders could better understand the project. Related people collected their views and suggestions of the project and made reasonable explanations and related commitments in time. Thus, the purpose of public participation was realized. The results could be summarized as: after this project is completed and operated, the local air quality will be improved, the living environment will be optimized and significant environmental benefits will be achieved. However, during the project executing process and after the project operation stage, there will be construction fugitive dust, construction noise, equipment operation noise and other environmental influences, thus, the construction units are required to carry out pollution prevention measures during the construction period and the operation period together with the operation unit and manage them strictly so as to really reduce their adverse impacts on the environment and the public and so that the economic, environment and society benefits can be gained after the project operation. Public participation results in the consultation activities showed that 95% of the people made it clear that they supported the project construction and nobody objected to the project construction.

11.5 Project Information Release and Suggestion Feedback (Appeal) Mechanism

1. Information release

In order to ensure that the group affected during the implementation of the project can quickly know related information and to ensure that interests of the affected groups can be fully considered during the project construction and the operational process, this project establishes effective mechanisms for information release, which are as follows:

Phase 1: Project preparatory stage. The construction unit and the environmental impact assessment unit shall release the information in the form of media publicity, the disclosure, the symposium, the interview and the public participation questionnaires. In addition, related demands and feedback of the people affected shall be faithfully recorded.

Phase 2: Construction phase. The construction side shall release the information in the form of community conferences, disclosures and hot-line to affected parties (such as the local government, the enterprise and the residents).

Each construction site shall put up clear information disclosures about the project, which shall include but not limited to:

1. Project overview;
2. Construction plan;
3. Main construction activities;
4. Main environmental problems and relief measures;
5. The name and telephone of the project manager, the supervision engineers and the environmental protection persons.

The construction units and the environmental quality supervision engineer shall communicate regularly with main sensitive receptors (such as residents nearby, enterprises, cultural protection units, etc.) and shall hold symposiums so as to reduce adverse effects as much as possible. The construction unit shall communicate with local parties to be affected in terms of construction activities (e.g., excavation lines), which may have a huge impact.

All contractor shall provide workers with the training on surrounding relationship maintenance and communication, local customs and the code of conduct. Complaint channels must be

released at the entrance of the construction site. Main construction site office shall have complaints registration and all complaints, problems and relevant matters must be incorporated in the feedback report and be submitted to the environmental supervision engineer and the construction unit for reviewing. Complain contents to be corrected and treated shall be sent to related parties so as to ensure that complainants can be satisfied with the results.

The construction unit shall open the telephone hot-line so as to understand concerns of the affected residents and resident units in a timely manner. In addition, the construction unit shall answer their questions. Problems of environmental protection shall be properly solved by consulting the local environmental protection administrative departments.

Phase 3: Operation stage. A dialogue mechanism, which can provide a telephone hot-line to monitor and evaluate environmental impact problems of heat pipe and supporting facilities, shall be built for beneficial parties during the project operation stage. The above dialogue mechanism is mainly set to ensure that all relevant institutions and the public can feed back environmental impacts brought by the project operation.

Environmental monitoring and management information during the project operation stage, which can be shared by the interest parties.

The construction unit shall organize a dialogue conference of beneficial parties each year. Beneficial parties being invited shall include representatives of major government agencies, surrounding neighborhood and groups. The demands, discovery and suggestions will be formally conveyed to relevant government departments so as to take necessary follow-up actions to ensure that environment quality standards.

The release channel of the above information will be told to the public through media, conferences or other ways so that they can fully understand the information releasing situations. At the same time, publicity media tools shall be used to strength the publicizing and reporting. All aspects of public opinions and the suggestions shall be arranged to information provisions so that they can be timely researched and treated by relevant institutions at all levels process in a timely manner.

2. Opinion Feedback (Complaint) Mechanism

In order to effectively solve problems arising in the project implementation process and to safeguard smooth operations of the project, a feedback (complaint) mechanism shall be established. After the construction unit or the building unit receives the environmental complaint of the rectification notice of administrative departments, they shall organize visiting and investigations together with the design and related departments. In addition, they shall rectify and reform them according to the actual situations. At the same time, the rectification scheme shall be released so as to solve environmental disputes. After the rectification notice is received, it shall be finished within three working days (10 working days are needed if the coordination of management institutions are needed. The feedback mechanism can be divided into two Phases:

Phase 1: During the project environmental impact assessment period, after related information is released, the construction unit and the environmental assessment unit shall gather residents' opinions through holding symposiums, putting up disclosure and making on-line publicity. The public can feed their opinions through the symposium or see the first draft of the project environmental impact assessment and raise their opinions. They can also send letters, fax or e-mail to the construction unit or other entrusted environmental impact assessment institutions. In addition, they can also submit their written opinions to competent administrative department for the examination and approval of environmental protection impact statement. The construction unit or its entrusted environmental impact assessment institutions and the competent administrative department for environmental protection shall place original data collected on files for future inspection.

Phase 2: During the project construction or operation stage, the public can send letters, fax or e-mail to the construction unit or other entrusted environmental impact assessment institutions. They can also feed their opinions to the Sub-project City (County) Environmental Protection Bureau and the Complaints Office.

Measures shall be taken to ensure that the appeal channels are transparent and efficient. Specific requirements are as follows:

1) If residents are affected by any aspect of the environment, they can raise their complaints to the project management office and the project office shall give the decision to treat the complains within 2 weeks.

2) If the residents are still not satisfied with decisions of the project management office, after receiving the decisions, they can complain to administrative organs that have jurisdiction rights level by level for arbitration according to regulations of *Administrative Procedure Law of the People's Bank of China*.

3) If the residents are still not satisfied with arbitral decisions, after they receive the arbitral decisions, they can sue to the civil court according to the *Civil Procedural Law*.

4) The residents can make appeals (or file a lawsuit) on any aspect of environmental managements, including the compensation standard, etc.

5) The appeal way can be told to residents so that they can fully understand that they have the right to make appeals.

6) The organs taking charge of residents' appeals will not collect any fees. The fees caused during the appealing process shall be paid by the construction unit.

7) All appeals shall be recorded regularly, traced and reported on a regular basis:

    - Record content including: The complaint record sheet mainly include basic situations of the plaintiff and the complaints, basic situations of the replyer, the solution and the effects to be achieved.

    - Tracking content including: Pay a return visit to the complainant to see whether the complaining events are treated and whether the complainant is satisfied with the results.

    - Regular report including: Appealing situations shall be reported to a superior organ regularly in the form of a written report. They shall also be written into the implementation plan of the following project.

The construction unit shall arrange full-time environmental protection personnel to be responsible for collecting and receiving discontents and complaints of the affected population. The name, office address and contact phone number of the head of the construction unit shall be published.

According to the public feedback, on the basis of environment monitoring report and inspection reports of supervision institutions,relief measures in the environmental management plan will be adjusted so as to further improve the environmental management activities.

If significant deviations compared with contents of the environmental management plan are found during inspection or changes to the project cause great adverse impacts on the environment, or the number of people affected by adverse environmental impacts significantly rises, the project management office will immediately consult the environmental agencies and will set up additional environmental assessment groups together with the World Bank for additional public consultations if necessary. The modified environmental management plan shall also tell the implementing agencies and contractors so that they can do operations according to

modified contents.

11.6 Public Participation in Summary

According to the public survey results, the vast majority of individuals and institutions support the construction of this project. The questionnaire surveys of Chengde sub-project, Pingshanzi sub-project, Xingtaizi sub-project and Zhangjiakou sub-project show that the ratio of the informants firmly showing that they support the project is 95%, 100%, 98% and 95% respectively. No one object the project construction.

During the activity conduction process, the public generally concerned more about the construction noise and dust impacts and the influence of the traffic jam. After understanding the relief measures to be taken, most of the public said they can accept the project

The sub-project construction unit talked and discussed with government management departments and enterprises with special impact and get their understanding and support for project implementation. These stakeholders affirmed the relief measures and solutions taken for environmental impacts and environmental risks of project construction. This reduced possible risks appearing during the implementing process.

12. Environmental Monitoring Plan

12.1 Purposes and Content of Environmental Monitoring Plan

Environmental Monitoring Plan (EMP) is aimed to eliminate or reduce the adverse impacts of project construction on environment and society as much as possible by formulating technically feasible and financially sustainable and operable environmental countermeasures based on the inevitable adverse environmental impact across the whole project implementation.

EMP mainly consists of mitigation measures developed for the adverse environmental and social impact in construction and operation periods, monitoring plan, institutional arrangement, training plan, public consultation plan and relevant cost estimation.

12.2 Environmental Management System

According to relevant provisions and actual requirements of project implementation, besides that environmental protection agency performs its regulatory functions for the project, specially-assigned personnel of project management offices at all levels are responsible for environmental management affairs to establish environmental management system in construction and operation periods for supervisory agency, implementation agency, consultation service agency and others, with details in shown in **Table 12-1** and **Table 12-2**.

Table 12-1 Environmental Management System during the Construction Period

Nature of project agency		Name of project agency	Main responsibility
External management	Supervision agency	Environmental protection bureau	Environmental management supervision
		World Bank	Supervise and review the implementation of EMP
Internal management	Management agency	Provincial, city/county PMO	Overall supervision and management
		Construction unit	Responsible for overseeing and manage the implementation of environmental protection measures, take responsibility for environmental management
	Measures implementing unit	Contractor	Implementation of environmental protection measures during construction period
	Consulting service	Environmental supervising unit	Strict supervision of Environmental engineering quality and contractors for implementing environmental protection measures.
		EIA institute	Provide consulting service arise along the project implementation
		Environmental monitoring unit	To conduct on-site environmental monitoring based on the requirements in the EMP and provide monitoring report on time

Table 12-2 Environmental Management System during the Operation Period

Nature of Agency		Name of Agency	Main Management Responsibility
External Management	Supervisory Agency	Environmental Protection Bureau	Environmental management and supervision in operation period
		World Bank	Supervising and Examining the Implementation of the EMP
Internal Management	Management Agency	Provincial, Municipal (County) PMO	Undertake the responsibilities for environmental protection and management in

			project operation period, and fulfill overall supervision and management
	Measure Executing Unit	Construction unit and operation unit	Carry out environmental protection measrues and entrusted monitoring in oepration period. Collect pollutant discharge monitoring report (data) from heat source unit.
	Consultation Service Agency	Environmental Monitoring Unit	Implement environment monitoring and issue monitoring results in project operation period.
	Agency for relevant projects	Heat source unit	Carry out environmental protection measures and environment monitoring in project oepration period, and provide pollutant discharge monitoring report (data) for cosntruction unit.

12.3 Environmental Management Agency

The environmental management institutional structure of the project includes the project management agency, the supervision agency, the construction and the implementing unit, the consulting service provider, and the monitoring agency, with specific responsibility of each agency shown in **Table 12-3**, and management agency for construction and operation periods respectively shown in **Figure 12-1** and **Figure 12-2**.

Table 12-3 Functions of Each Agency in Environmental Management System

Type of agency	Name of Agency	Functions of Each Agency
Supervisory Agency	World Bank	1) The World Bank will assign annual review mission to conduct special inspection for project construction; 2) Check implementation of *EMP*.
	Environmental protection agencies at all levels	Carry out whole-process environment monitoring and supervision in the project, including: approving project EIA report (EIA for subprojects included), as well as environmental supervision and management in project construction and operation stages.
Management Agency	Provincial PMO	1) Contact with the World Bank; 2) Overall supervision and management.
	Provincial, Municipal (County) PMO	1) Report to governmental administration agencies, coordinate with other relevant agencies to solve environmental problems; 2) Supervise the fulfillment of environmental protection measures according to environmental assessment requirements; 3) Organize and implement training plans on environmental management; 4) Cooperate and coordinate review mission for environmental safeguard (including World Bank review mission).
Implementing unit	Construction unit (project construction unit)	1) Assure that all environmental protection measures proposed for the project are included in civil work contracts of bidding documents; 2) Assure that all environmental protection measures and requirements proposed by *EMP* are included in contract for project construction; 3) Recruit environmental supervisor, supervise and coordinate about environmental monitoring work (qualification, duties and management); 4) Recruit external environmental monitoring unit for environment monitoring in construction and operation period; 5) Report the implementation of *EMP* to PMOs at all levels; 6) Record and sort out complaints in project construction and operation period, report such work to PMOs at all levels, and announce results to the public as per complaints.
Supervisory Agency	Project supervisor (engaged in environment	1) Accomplish environmental supervision, review relevant environmental reports, and implement mitigation measures for environmental impact in construction period;

Type of agency	Name of Agency	Functions of Each Agency
	supervision)	2) Supervise the implementation of dust-raising and noise control measures and water & soil conservation measures in construction area. Supervise disposal of domestic refuse, epidemic prevention, etc. 3) Provide solutions to relevant environmental protection issues encountered by contractors during project construction period; 4) Cause contractors to prepare and submit environmental monthly report; 5) Prepare and submit environmental supervision monthly report.
Execution unit	Contractors and operation unit	1) Implement various environmental protection measures; 2) Coordinate about on-site environment monitoring; 3) Accept supervision and inspection of environmental protection by project supervisor, the World Bank and environmental protection agencies at all levels; 4) Report the implementation complaince of environmental protection measures.
Monitoring Agency	Environmental Monitoring Unit	Periodically conduct environment monitoring during project construction and operation period, and submit environment monitoring report to construction unit according to *EMP*

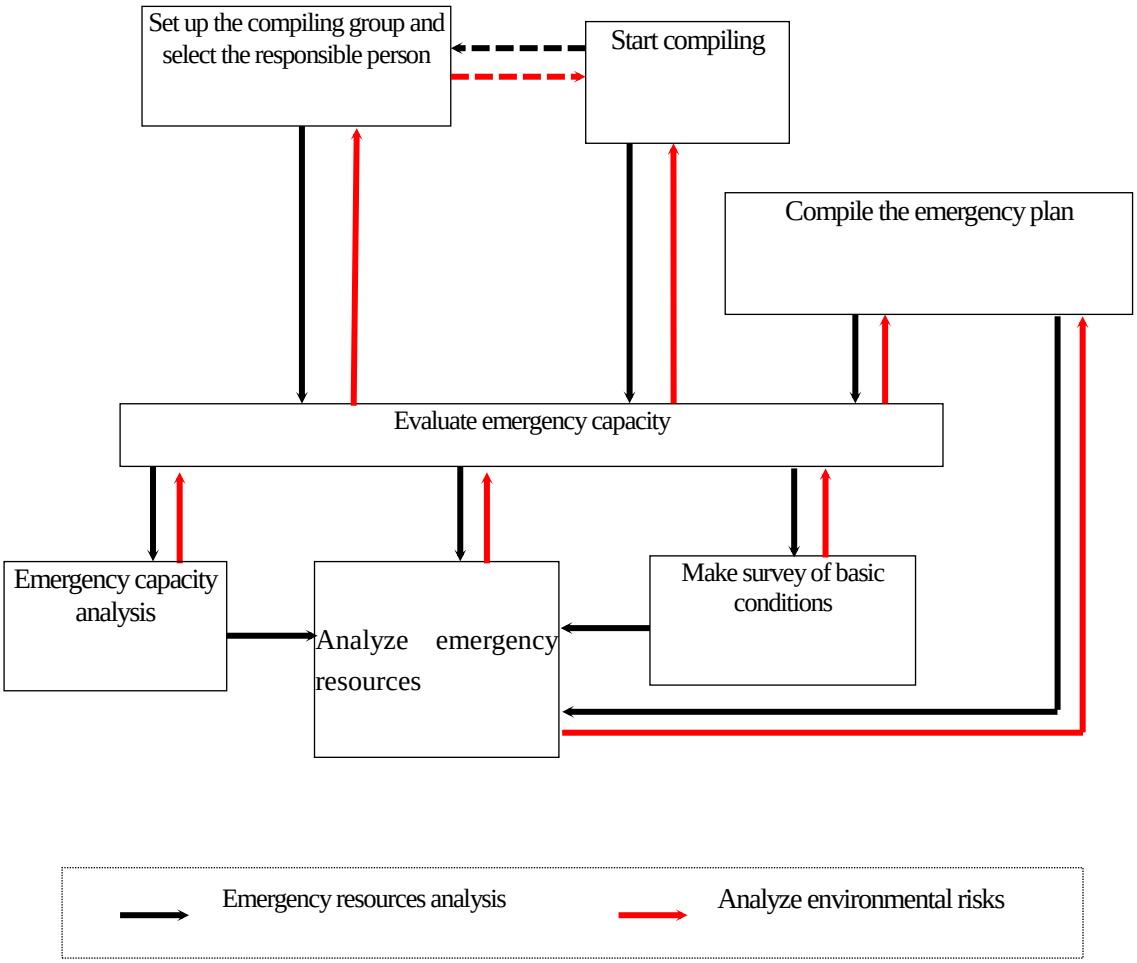

Figure 12-1 Institutional Diagram of Environmental Management Agency during the Construction Period

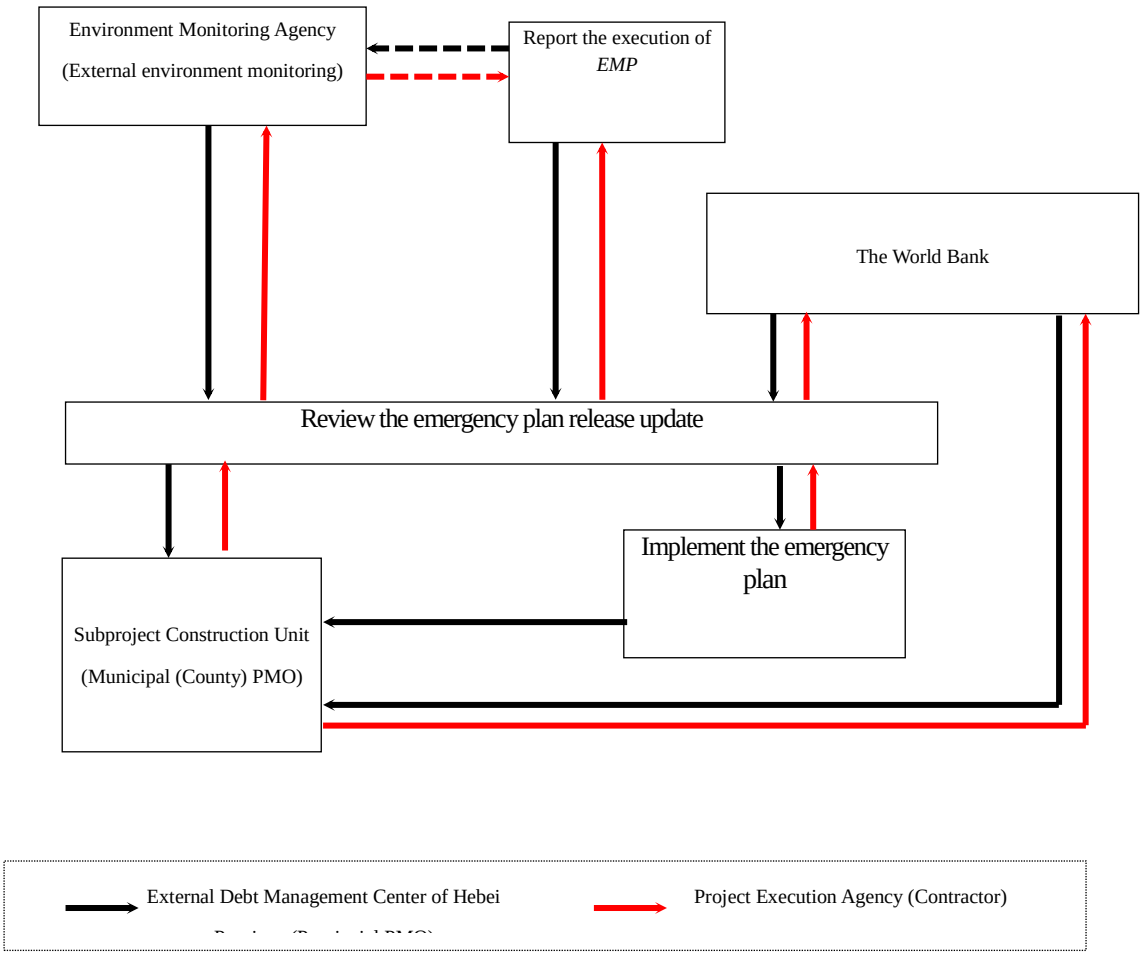

Figure 12-2 Schematic Diagram of Management Agency for Operation Period

12.4 Environmental Management and Impact Mitigation Measures

12.4.1 Design stage

Learned from experience and lessons in similar projects, some mitigation measures for environmental impact and risks have been taken into consideration and implemented in project design and preparation period, to make reasonable use of heat source, reduce pollutant discharge, improve centralized heating management effect and level, and prevent the avoidable environmental problems and other adverse impact in project construction and operation phases. See details in **Table 12-4**.

12.4.2 Construction period

Major environmental impacts in construction period include: (1) impact of heat exchange station and heat supply network construction on acoustic and atmospheric environment; (2) solid waste discharged during heat exchange station and heat supply network construction; (3) impact on local traffic in construction period; (4) solid waste generated from small boiler demolition and impact on health and safety of workers.

According to potential environmental impact in construction period, comprehensive mitigation measures have been developed, including environmental protection measures for particularly sensitive targets. *Regulations on Environmental Protection of Heat Exchange Station and Pipeline*

Laying Construction Works has been established (see details in Attachment A). Mitigation measures for general environmental impact in project construction period are summarized in **Table 12-5** and mitigation measures for specific environmental impact summarized in **Table 12-6**.

In addition, 1) on-site investigation confirmed that there is no culture relics under protection within construction scope of each subproject; 2) separate *EMP for Small Boiler Demolition* (see details in Attachment B) has been exclusively prepared for possible dust, noise and solid waste discharge from small boiler demolition which is constructed concurrently with the project; 3) prevention and mitigation measures for due diligence, small boiler demolition, environmental and security risk evaluation and social evaluation have been classified into summary of environmental impact mitigation measures according to the level of impact.

12.4.3 Operating period

Major impact during operation period include: (1) impact of heat exchange station operation on sound environment quality; (2) environmental and safety risk impact of operation of heat exchange station and pipeline network.

General and specific potential adverse environmental impact of operation of each subproject and its mitigation measures are shown in **Table 12-7** and **Table 12-8**.

12.4.4 Follow-up Actions by Heating Sources

In order to improve pollution control performance of heating facilities, some follow-up actions will be taken by Pingshan and Xingtai subproject heating sources in parallel with implementation of the Project to ensure compliance with applicable pollution control standards. Detailed follow-up actions to be taken by the heating facilities are given in Table 12-9.

12.5 Environmental Monitoring Plan

Environmental monitoring is an important part of environmental management. By developing and strictly implementing necessary environment monitoring plan, the implementation progress and effect of mitigation measures for the project may be effectively inspected, to ensure environmental impact within acceptable scope. Periodical environment monitoring and result analysis help determine whether the adverse environmental impact forecasted in project preparation phase has been sufficiently relieved. If necessary, adjust or improve the mitigation measures to assure that environmental protection measures are well implemented to minimize the adverse impact, particularly the impact on environmental sensitive targets.

Environment monitoring plan covers monitoring in project construction and operation periods as well as due monitoring of related projects. As required by the World Bank, 1) environment monitoring in construction and operation periods within the project scope is in the charge of construction unit for each subproject while implemented by contractor and heat supply operation unit. Monitoring of discharge by heat source and power plant is in the charge of heat source and power plant. 2) Environment monitoring by all units is supervised by local environmental protection bureau. 3) Environment monitoring shall be undertaken by qualified monitoring unit in accordance with regulations in monitoring plan. The monitoring unit shall then issue formal environment monitoring report.

Environment monitoring plans for 4 subprojects are shown in **Tables 12-10 to Table 12-13**. It includes estimated monitoring expenses.

Table 12-1 Environmental Impact and Risk Mitigation Measures in Design Stage

Element	Mitigation Measures	Implementing Unit	Supervisory Agency	Expenses (CNY 0'000)
Reasonably utilize heat source and reduce pollutant discharge	① Achieve combined heat and power generation by using local existing heat source and eventually achieve large-region centralized heat supply through optimizing heat supply pipeline network; ② Since heat is sourced from those heat source plants determined in heat supply planning, construction of combined heat and power generation conforms to local heat supply planning. In addition, construction of heat supply network by local heat supply agency is concurrent with the project construction, avoiding repeated construction of thermoelectric project or unmatched construction duration between heat supply network and the project; ③ Gradually achieve fuel cleaning to reduce pollutant discharge; ④ Take heat balance stability in pipeline system into consideration during project design.	Designing institute	Construction unit (county PMO)	Included in design fee
Reduce environmental and other adverse impact in construction period	① Take a full consideration in site selection for heat exchange station to minimize adverse environmental impact on sensitive targets; ② Enhance exploration and investigation in design stage to avoid excavation in construction interfering or destroying underground utilities for municipal facilities, communication, electricity and gas; ③ Develop reasonable construction plan to avoid pipeline tied-up, cross construction, outside destroy or other abnormalities; ④ Take possible impact on social activities, urban traffic and cultural relics into consideration in project construction design to avoid or reduce adverse impact; ⑤ Arrange sufficient public consultation activities in project preparation stage to facilitate establishment of sound construction plan, assuring smooth construction; ⑥ Set reasonable budget for environmental mitigation measures and environment monitoring into project cost. It is also required that these estimated budget shall be listed in construction contract for construction unit to specify duties and work content of each agency.			
Reduce environmental impact in operation period and avoid environmental issues	① In design and preparation stage, develop operation requirements for project operation, requiring to periodically inspect and supervise heat supply pipeline, prefabricate signal line for monitoring in insulating layer of pipeline for real time monitoring of pipeline for having leakage timely identified and repaired; ② The inlet and outlet of pipeline in pump should install vibration absorber pump. The foundation of pump should adopt vibration-decreasing measures. Acoustic shield should be added to reduce noise. ③ Choose environmental protection equipment with low noise, and keep maintenance and repair regularly. ④ Heat exchange station is equipped with sound proof doors and double-layer closed sound proof windows; adopt sound proof structure when constructing heat exchange station; newly built equipments for heating station should be in reasonable layout;			

	⑤ It is required to enhance safety awareness to avoid chaos in or delay of emergency response in project construction and operation periods, in order to avoid safety risk caused by external factors.			
Reduce possibility of environmental risks in construction and operation periods	① Design buildings and structures according to requirements specified in national earthquake resistance code, with earthquake fortification reaching level 7. ② Make sure fire protection rating of buildings and structures which also should be equipped with effective fire extinguishing system; ③ Buildings and structures shall be equipped with water supply, drainage and heating systems to ensure domestic drinking water quality and drainage standards are met; ④ Make sure buildings and structures in well natural lighting and ventilation condition to create healthy and hygienic working environment; ⑤ Minimum safe net distance of electric equipments in different voltage classes should not be less than the minimum distance required by relevant instructions; damage blocking device should be configured between disconnecting switch and earthing knife-switch of corresponding breaker to improve security; all electrical equipments should be equipped with leakage protectors and safely grounded; ⑥ All places require illumination in buildings and structures should be equipped with fluorescent lamps, waterproof lamps, corrosion-proof lamps and emergency lighting fittings; ⑦ Equipments in heat exchange station and pipeline of external surface temperature ≥50°C should be configured with heat preservation layer to save energy and protect people being scalded or suffering heat radiation; ⑧ Valve inspection well of heat supply network should be designed according to requirements of *Design code for city heating network* (CJJ34—2010); ⑨ Zhangjiakou gas-fired boiler DCS system shall be designed to meet the requirements in *Code for furnace safeguard supervisory system in fossil fuel power plant* (DL/T1091-2008) and other relevant instructions; ⑩ Zhangjiakou gas-fired boiler shall be equipped with ultra-low nitrogen combustor and exhaust purification system to have concentration of NOx in the exhaust lower than standard limit; ⑪ Doors of equipment rooms should be designed open outwards. Hot water station building of length larger than 12m should set up 2 exits. Safety valves on hot water pipeline and equipment should be equipped with drain-pipe connected to safety place which should also be equipped with enough section area and anti-freezing measures for smoothly discharging. Drain-pipe should not be configured with valve.			

Table 12-5 General Environmental Impact and Mitigation Measures in Construction Period

Project	Environmental Elements	Mitigation (Prevention) Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 0'000)

Project	Environmental Elements		Mitigation (Prevention) Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 0'000)
Construction of heat exchange station and pipeline network, including coal-to-gas reconstruction of initial heating station, pressure isolation substation and boiler, and demolition of small boiler	Natural Environment	Acoustic Environment Noise from construction of coal-to-gas reconstruction of initial heating station, pressure isolation substation and boiler	① To select low-noise equipment; set up sound insulation hoarding sheet around construction site in case of relatively long-time construction with high frequency noise; ② Achieve rational layout on construction site to avoid local excessive sound level. Place some equipments with high noise centralized, make fixed noise generating source away from sensitive targets and operate equipments with high noise in shelter as much as possible to minimize noise in construction stage; ③ Periodically maintain and repair machinery equipments to assure their normal and stable operation and avoid equipment in poor operation causing noise pollution; ④ Develop scientific construction plan to avoid concurrent operation of high-noise equipments and strictly control operation duration of high-noise machinery. Restrict equipment operation from regulated time duration (12:00-14:00 pm, 22:00 pm - 6:00 am in the next day); ⑤ Purchase commercial concrete rather than installing concrete mixer on construction site; ⑥ Vehicles for materials, earthwork and stonework and construction muck delivery should be kept in a rountine and away from residential concentrated area and transportation time beyond sensitive duration (22:00 pm - 6:00 am in the next day). Transportation vehicles should slow down and no horn-blowing when entering and exiting construction site. Construction unit shall keep transportation vehicles in good technical performance with tightened structure and no screaming in braking; ⑦ Set up barrier around buildings and structures when handling earthwork and stonework and construction structures to mitigate the impact; ⑧ Build boundary fence with height of 2.2m before start construction; ⑨ Adopt stationary or movable acoustic enclosure or noise barrier for local obstruction when operating electric generator or other high-noise equipments; ⑩ Reduce human-made noise as much as possible when disassembling baffle or holder, and loading and unloading materials or muck. ⑪ Immediately shut down idle equipments; ⑫ Enhance environmental supervision in construction period. Construction unit should dispatch special personnel in charge of construction machinery maintenance, and organize on-site workers in periodical training to avoid burst noise from fault equipment; ⑬ Construction unit should report to administration for environmental protection of the People's Government to obtain approval 15 days before commencement of project in accordance with provisions of *Law of the People's Republic of China on*	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau	Third-party Monitoring	L_{Aeq}	**541**

Project	Environmental Elements		Mitigation (Prevention) Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 0'000)
			Prevention and Control of Pollution from Environmental Noise. Reporting content should cover project name, construction place and duration, possible environmental noise value and environmental noise pollution prevention and control measures to be taken.					
		Atmospheric environment Construction dust, including dust from coal-to-gas reconstruction of initial heating station, pressure isolation substation and boiler	The following measures should be taken during construction of pipeline network and heat exchange station: ① Construction area must be isolated with enclosure and taken watering measures to reduce dusting. The barrier on construction site should be stable and tidy. Clear the generated waste every day. Prohibit open earthwork excavation or long-time piling up waste; ② Building materials and earthwork prone to raising dust during construction should be covered with tarpaulin; ③ In case of earthwork excavation or backfill in dry weather easy to raise dust, it is necessary to conduct water sprayting for dedust and shorten dust causing activity duration. In case of windy weather higher than level 4 or air quality warning issued by government, stop on-site transporting materials prone to raising dust, stop dusting operation such as earthwork excavation or refill, and cover building materials with dustcloth; ④ Take covering measure for such building materials that is prone to raise dust including earthwork and stonework, cement and lime to avoid scattering along the transportation; prohibit from dispersing aloft or careless loading & unloading; make sure materials not scattered or leaked; ⑤ Entrance and exit of construction site should be cleaned periodically and set vehicle washing facilities to avoid sand being carried outside the construction site; ⑥ Welding should be conducted within on-site enclosure, increase and heighten the enclosure if necessary; ⑦ Prohibit on-site concrete mixing; use pre-mixed mortar; prohibit from on-site pitch mixing or heating; ⑧ Concentrate, classify and pile up construction waste and residue muck in construction area for daily clearing up waste generated; waste should be transported with closed vehicle or covered with tarpaulin, to avoid waste scattering along the transportation; prohibit waste being piling up for a long time; ⑨ Transportation vehicles and other construction machinery should be equipped with completed exhaust purification device to make exhaust meet emission standard. Fixed equipment exhaust blowdown stack should be arranged away from residential area and in sufficient height for diffusion;	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau	Third-party Monitoring	Total suspended particulates (TSP)	**343**

Project	Environmental Elements		Mitigation (Prevention) Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 0'000)
			⑩ Adopt construction machinery in conformity with requirements of relevant pollutant control standards and periodically maintain them to always make sure them in normal and smooth operation condition; ⑪ Construction unit should arrange special personnel in charge of environmental protection in construction period, provide corresponding training for operators and strictly execute various measures for preventing and controlling dust; ⑫ When pipeline network completed, construction unit should dismantle enclosure, safety protection facilities and other temporary facilities set on construction site within 2 days; clean the construction site and surrounding places. When heat exchange station completed, construction unit should dismantle enclosure, safety protection facilities and other temporary facilities set on construction site within one week; clean the construction site and surrounding places. For construction of first heating station and pressure isolation substation, besides the above mentioned measures, the following measures should be taken: (1) Main roads and working place on construction site should be paved, and barren place and that for piling up earthwork should be covered with tarpaulin, solidified, greened or handled with other measures; (2) Place for storing building materials must be flat and solid; those building materials prone to raising dust such as earthwork and stonework, cement and lime must be stored in closed space or covered with tarpaulin; sand should be piled into rectangular shape and stone piled into rectangular shape according to different grain diameters, with both covered with tarpaulin to avoid dust raising; (3) Water the area and roads prone to dust raising in regular time every day; (4) Entrance and exit of construction site should be configured with vehicle washing area to clean wheels of incoming and outgoing vehicles.					
		Water environment Small amount of waste water produced during construction	① Public toilets (facilities) is encouraged to be used in the work field during construction. Temporary mobile toilets are supposed to be set up if there is no public sanitation nearby. Indiscriminate discharge is strictly prohibited on the spot. ② Sedimentation tank should be set, muddy water used in the construction should be clarified in the sedimentation and then be reused; ③ a special drainage channels are set at the construction location, which make small quantity of sewage discharge into the sewage pipe network instead of the surface of the earth;	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau	/	/	**135.7**

			④ sand, cement and other materials should be protected from rain when being stacked in the construction site, which can prevent surface runoff from the rain to pollute nearby natural waters.					
		solid waste and a small amount of solid waste generated during the construction period: construction waste and scraps and materials	Measures for solid waste generated by construction of heat transfer station and pipe network are: ① construction wastes should be transported to some location designated by urban administration agency; construction waste can not be dumped randomly and dumping sites for construction waste are not allowed to be set randomly, construction wastes are also not allowed to be sold and accepted. ② All spoil should be used for backfill. ③ temporary soil pileup come from sectional construction of the pipeline should be within the construction red line. Straw bag with soil bags are stacked around the construction site, Water should be sprayed to construction site to .water should be sprayed regularly to reduce dust impact based on weather condition like windy day or rainfall; ④ Vehicles for transporting construction waste shall follow arranged route, schedule and location, and should be properly loaded. Closure, packing and covering measures should be taken to prevent leakage and spillage ⑤ Waste metal parts, equipment spare parts and insulation material should be transported to designated disposal site in accordance with general industrial waste disposal requirements. Measures for solid waste generated by the demolition of small boilers are: ① construction waste, waste slag and ash and waste insulation materials are centralized to store and shipped to Chengde city construction waste landfill site for concentrated disposal; ② abandoned boiler equipment and associated equipment shall be sold to scrap purchasing station; ③ after the closure of the old boiler, incomplete ground for original boiler installation should be back filled to keep the floor clean.	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau	/	/	**91.5**
	Ecological environment		① Make full use of natural topography in the region, to reduce temporary excavation area as much as possible, to mitigate the destruction to vegetation; to reduce the occupation of road greening land; to reduce the amount of excavation and fill, to try to make the balance of the earthwork of project; in order to protect the surface soil, stratified excavation, backfill measures; to excavate earth and back fill layer by layer in order to protect the mellow soil on the surface; ② During the construction period of pipeline, the way that a section should be recovered after its construction completion should be taken, the earth should be	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau	/	/	**161.6**

			backfilled and vegetation should be recovered timely; ③ to reduce mixing construction materials in the site to mitigate the possible influence to the soil; ④ temporary soil pileup come from construction should be held back by straw bags with soil and measures of covering should be taken ⑤ vehicles used for construction are not allowed to make ways at random; ⑥ to restore the green and original function of the land as soon as possible when the construction of the project completed; ⑦ to build ecological environment construction supervision system of the construction period to ensure the implementation of measures.					
	Conservation of water and soil		① Spoiled soil should be disposed properly and utilized comprehensively to prevent soil and water loss ② Strictly comply with design requirements, to take measures of blocking for nearby area where soil and water are easy to lost to narrow the range of influence; ③ Spoiled soil excavated during the construction should be pilled up in a central area. To try to excavate and back fill at the same time, to try to reduce the spoiled soil as much as possible to mitigate the soil and water loss ④ Temporary soil pileup should be held back by straw bags and covering measures should be taken.			/	/	**180.7**
	Social environment	Residents living, transportation, commercial and cultural relics and etc.	① Careful preparation should be done before construction. Construction program should be confirmed with relevant agencies and emergency-response program should be in place to ensure the normal circumstance of surrounding residents' daily life; ② Relevant power agencies should be consulted in advance to confirm power use plan. In area with insufficient power capacity, expansion should be done in advance to prevent temporary power failure and disturb daily life of the residents and business along the pipeline; ③ Appropriate people should be assigned to contact with the communities, schools, hospitals and other agencies in the construction area and when it is necessary, they are asked to assist to solve the problems generated in the construction so that the normal work will not be disturbed. ④ Transport scheme during construction should be disclosed to the public through television, newspapers, radio and other media. Notice of bus route or station changing should be posted in the bus and at bus station. At the same time the bus company should set up a hotline for public consultation; ⑤ Billboards should be placed at the construction site indicating main contents of the project, construction time and contact person and hotline should be provided to obtain public understanding of the inconvenience caused by construction	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau	Social Assessment Monitoring Institute of the Third Party	Contents of social activity plan	**235.6**

			activities, ⑥ Height and direction of the construction lamp shall be considered not to affect residents during night; ⑦ Warning signs and traffic guiding signs should be posted in affected area in accordance with relevant requirements;					
		Other	Properly resettle the boiler workers' training and reemployment from the closed small boilers. They will mainly hired as workers working the heat transfer station for maintaining or some similar posts with the original heating company.	Local heating company	Construction unit, local	/	Re employment rate	**0.2**
Construction period	Environment and security risk	Pipeline construction risk	A) To select qualified thermal insulation materials and to conduct anti-corrosion appropriately; to select qualified pipeline accessories like valve, compensators and etc. The steam pipe should be high enough to be across the walkway, the road and the height limit sign should be there on the road. B) Determine burial depth of pipelines according to requirements and make stability checking. The type selection of compensator is determined by calculation and all kinds of adverse conditions should be taken into account . To select qualified piping accessories, and to detect the attachment of the welding seam 100%. Fixed bracket thrust is determined by calculation and all kinds of adverse conditions should be taken into account . Consider the local seismic intensity when handling foundation and laying pipelines. C) Determine burial depth of pipelines according to code requirements and make stability checking. Arrange dust cushion and conduct punning when the pipeline foundation construction starts. Consider the local seismic intensity when handling foundation and laying pipelines. D) To strengthen exhaust device settings of the pipe and equipment, to reduce the remained the air in the pipeline and circulating water pump. It is better to install an exhaust valve on the high point of the pipeline. The pipeline should be injected with water and exhausted before the pump starts and the remain air in the pipe is exhausted after the pump starts. To select the pump with stable quality and strengthen the maintenance of equipment. The outlet valve and cut-off valve must operate smoothly and maintained regularly. To strengthen the adjustment of pipe network load and extreme temperature changes should be avoided. Time curve of the on-off of the pump butterfly valve should be in line with the design requirements and can be adjusted, and it should be protected from water hammer caused by hydrophobic in the pipe from rapid opening of the pipeline. The pipe should be fully warmed before starting. E) Based on the reconnaissance results, the project pipeline network will not be crossed with other municipal pipelines; during the project preparation and	Contractor	Construction Unit, local Environmental Protection Bureau, Safety Supervision Bureau, Construction Management Authority	/	/	20

			desigh period, the site investigation still need to be strengthened. An instant investigation and report must be undertaken once an unknown pipeline is found, which can prevent damages to the municipal pipe network. Where there is a lot of other pipeline parallel or cross with the heat pipe, there must make careful measuring and line planning before construction and relative position should be clearly indicated. When the distance is short, mechanical excavation should be replaced by manual excavation. When construction activities are carried out near important lines like gas, water, important fiber and etc., relevant agencies should be informed to the scene and preparatory work should be made in case of emergency preparedness. F) Relevant agencies referring to planning, municipal, communications, electricity, gas and etc. should be informed about the pipeline route, buried depth, the pipeline location maps of the road where heating pipeline pass by managed by other agencies should be provided.					
		Mechanical (vehicle) damage, electricity safety risk	A) Machinery with good quality, safety and qualified electrical protection device should be selected. B) Due to large transportation and busy traffic during the construction period, contractor should take the transportation influence on the construction schedule and safety, the safety signal must be set and working time and task should be arranged properly. C) The construction lamp and related facility should be installed on the construction site in the night or somewhere with unfavorable light; D) Various machinery, electric safety equipment should be inspected regularly and some safety problems should be solved promptly. E) Various safeguard devices(including power safety devices)of the machinery should be ensured to be sensitive and effective; F) The firefight working on the spot should be noticed and necessary firefight equipment should be there. G) Machinery should be operated in accordance with the operation rules; H) Operations must apply with various construction and safety regulations, non-standard operation is strictly banned. I) three-dimensional cross operation.should be reduced as much as possible in the construction.					
		Acetylene gas explosion risk	A) To carefully watch the logo of the spherical portion of the cylinder shoulder. "Next pressure testing time" should be focused in particularly. Regular technical inspection of the cylinder should be undertaken in the use in accordance with the requirements. Gas cylinders shall not be used for more than a period of time. B) External inspection should be made firstly before use it. The key points are bottle					

			valve, take over the thread, pressure reducer and etc.. If there is leakage, slider, ineffective hand movement or "climbing", it should be repaired promptly and any random treatment must be banned. Belt tightening valve stem is prohibited and the pad material must not be adjust . Soap water is supposed to be used to check the leakage and fire must be avoided. When the cylinder and electric welding are used in the same place, the bottom of the bottle should be insulated to prevent the cylinder charging. The piping and equipment that are in contact with the gas cylinder shall have a grounding device to prevent the combustion or explosion caused by static electricity. When the gas cylinder is used in winter, the cylinder valve or regulator may frost, then it should be thawed with hot water or steam instead of fire baking or knocking the bottle valve with iron, and adjusting jerk screw of the regulator can not be twisted to avoid gas out which may cause the accident. C) Violent vibration and impact should be avoided in the process of cylinder use and storage. light loading and unloading in the transportation and special frame or cart must be used and wire rope must be banned to directly lift cylinder. Railing or bracket must be used to fix the cylinder to prevent dumping. D) cylinders should be kept away from high temperature, fire and molten metal splash (distance beyond 10 m). It must not be under the sunshine in summer. E) Open the cylinder valve slowly or regulator to prevent the collision heat of jet high-speed airflow in the electrostatic spark discharge, solid particles and reduce chafe, gas by sudden compression release heat (adiabatic compression) which will cause the cylinders and pressure reducer explode and catch fire. F) Qualified special acetylene pressure reducer and the tempering should be used. G)The temperature of the surface of bottle can not exceed 4O°C. When used, the bottle wall should be often touched and if the temperature is more than 40°C (some hot) , the bottle must be stopped using. After water cooling and it should be sent to the inflation agency for checking. H)Acetylene bottle can only be erected when it is stored and used. It must not be laid in horizon direction in case of outflow of acetone combustion causing the explosion. After silent period of fifteen minutes of the bottle upright standing, it can be install on the regulator for application. It is generally to open acetylene bottle valve by 3/4 circle and do not exceed a lap and a half at most. I) ventilation should pay attention to Indoors for storing acetylene bottles and to avoid stagnation of of acetylene leakage. J) The distance between the acetylene bottle and the oxygen bottle is no less than 5.0m.					
		Risk management	A) To strictly implement principle of "safety first, prevention first, comprehensive management" ;					

		of safety production	B) construction personnel must strictly abide by three disciplines: to wear safety helmet on the construction site, to fasten the safety belt above the ground and to avoid high-altitude litter; C) To implement the responsibility for production safety, to perfect production management agency; D) To strengthen construction supervision and check on of the contractor qualification; E) To strengthen safety training and education to construction personnel, esp. especially for fresh workers, migrant workers who never work on the construction; mutual cooperation and information exchange between different construction units should be emphasized and focus on safety together. F) To strengthen design and review management of the construction agency, and safety management on the trial operation phase as well G) During the project construction period, construction units, site reconnaissance units, design units, construction units, project supervision units and other units related to projects construction safety must comply with production safety laws and regulations, ensure the safety of construction projects and take their own responsibility of safe production.					

Table 12-6 Environmental Impacts and Mitigation Measures of Construction Period Characteristics

Influence factor	Pollution source (and/or sensitive spot)	Special environmental impact	Mitigation Measures	Budget (CNY 10,000)	Implementer	Supervisor
Acoustic Environment	Construction noises in terms of sensitive receptors like schools, hospitals, as well as residential buildings and office space in the four subproject cities/counties, including various types of machinery and equipment noise (list of environmental sensitive receptors is given in Table 1-7)	Increasing the noise level of the construction area and its surroundings; affecting human auditory senses	① Set up higher fences for sound insulation,which should not be less than 3 m. When necessary, the practice of fenced construction would be employed in the operation area; ② Reduce human-made noise as much as possible when disassembling baffle or holder, and loading and unloading materials or muck. ③ In terms of construction around schools, the contractor shall consult with the school, reasonably arranging the construction work off school time, and trying to schedule high-noise construction during weekends or after school, at the same time, speeding up the construction progress and shortening the construction duration. Any construction work shall be prohibited during school exams. ④ Prior to the construction work around residential buildings with sensitive receptors, the contractor shall communicate with the relevant committees, and also notify the residents about construction schedule via committees. A public notice shall be posted at the entrance and exit to bring up the attention. ⑤ During construction, qualified institute shall be authorized by the contractor to monitor the quality of acoustic environment on site; activities shall be stopped when noise level	**18**	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau

			cannot meet applicable standard. The construction cannot be resumed until recheck results reaching the standard after reducing construction intensity and adjusting the operating methods. ⑥ For special road section that requires continuous construction, consultation with nearby communittee shall be done and approval shall be obtained, public notice shall also be made prior to construction;			
Atmospheric environment	Dust suspension in terms of sensitive receptors like schools, hospitals, as well as residential buildings and office space in the four subproject cities/counties (list of environmental sensitive receptors is given in Table 1-7)	Mainly affecting the quality of ambient air within the extent of construction, and also influencing the residents along the road construction (personnel, including the construction personnel), institutions, etc.	For sensitive receptors at residential and office buildings, as well as commercial shops etc., the following measures shall also be taken: ① Increase watering frequencies (2-3 times per day), reduce dust as much as possible ② Set up high enclosure around the boundary of construction site (no lower than 2.5 m); set up dust-proof net when necessary. ③ Forbid throwing muck in the air. ④ Reasonably arranging construction operation time, prohibiting from working at night or windy time; ⑤ The dump site shall be away from sensitive points; ⑥ All temporary mounds of earth should be covered. ⑦ Transport vehicles should travel at low speed when coming in and going out to reduce dust and ensure exhaust gas emission to reach the standards. The following measures shall also be taken for sensitive receptors at schools, hospitals, etc.: ① Increase watering frequencies (2-3 times per day), reduce fugitive dust as much as possible ② Set up high enclosure around the edge of construction site (no lower than 2.5 m); set up dust screen when necessary. ③ Forbid throwing muck in the air. ④ Reasonably arranging the construction work off school time. Prohibiting from constructing at night, exam, and windy time; trying to shorten the time limit of construction around schools and hospitals. ⑤ The dump site shall be away from schools and hospitals; ⑥ All temporary mounds of dirt should be covered. ⑦ Transport vehicles should travel at low speed when coming in and going out to reduce fugitive dust and ensure exhaust gas emission to reach the standards. The following measures shall also be taken at the important traffic crossing: ① Increase watering frequencies (2-3 times per day), reduce fugitive dust as much as possible ② Set up high enclosure around the edge of construction site (no lower than 2.5 m); set up dust screen when necessary. ③ All temporary mounds of dirt should be covered.	**23**	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau

Water environment	The removal of aged pipeline and pipeline network pressure test resulting in small amount of waste water discharging into surface water	Waste water discharging into surface water would increase the pollutant in the water	① Discharge pipeline residual water in the area containing municipal sewage pipes. Pipeline pressure test is, to drain pressure water in its interface with municipal sewage pipe. ② Special drainage channels are set up at construction site, allowing for small amount of waste water during construction discharging into sewage pipeline network nearby, instead of the surface.	**5**	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau
Social Impact	The impact caused by excavation construction, the increase of transport vehicles to sensitive receptors like important roads and special crossing, as well as the potential impact to various types of pipelines underground	The disruption in local traffic, the impact to school teaching, traffic congestion, and potential damage to various types of underground pipelines result in the interruption of social public services in any kind	① Prior to construction, the contractor shall communicate with the local Transport administrative agencies, work out traffic arrangements in the construction phase including the adjustment of vehicle routing, time arrangement, traffic control measures, etc.. Also informing the community in advance via television, radio, and newspapers etc. ② The contractor shall assign a dedicated person assisting traffic management at major roads and junctions during peak time, ensuring the traffic in order. ③ The color and appearance of the outer wall on the temporary dust and noise barriers at construction site shall be coordinated with local cultural relics, ensuring the integrity of urban landscape. ④ Construction activities shall be scheduled in summer holiday in the area near school and kindergarten, otherwise construction practice shall be optimized to reduce construction time at school entrance. Secure foot bridge or sidewalk shall be built for students with temporary use. ⑤ Construction material shall be placed in designated area far away from school and residential area; isolation zone shall be set up with warning signs. ⑥ Pipeline network contractors at total of 19 construction sites with important roads and crossings (1 in Chengde, 3 in Pingshan, 10 in Xingtai, and 5 in Zhangjiakou) shall have a clear understanding of the original pipeline drainage, electricity, gas, and communication in its layout at the construction site prior to construction, facilitating the cooperation with these business sectors to avoid any damage and interruption caused by the construction. ⑦ At total of 5 construction sites crossing highway and railway (4 in Pingshang, 1 in Xingtai), the contractor shall communicate with the highway and railway management agency prior to construction, ensuring secure construction methods. When needed, the contractor would invite these institutions to assist in solving the emerging problems and ensuring the completion of the construction work. ⑧ 6m away from ground surface for pipeline network crossing highways overhead; and 3m away from ground surface for pipeline network crossing highways geographically. In order to reduce the investment, the pipeline would be set up 1m away from road foundation.	**14**	Contractor	Project supervision, contractors, county PMO, Local Environmental Protection Bureau, civil administration, Authorities in charge of Transportation, Railway Management Department
Cultural Resources	For construction at Chengde guangren Street (West Street)	The sensory effect of the local tourism culture	The construction section of the barracks in Chengde Guangren Street (West Street), shall: ① The contractor shall communicate with local Competent Authorities of Transport and Communications, as well as local Ministry of Tourism in constituting reasonable	4	Contractor	Project Supervision, Construction

	Xiayingfang Section, inconsistency of the appearance of the outer wall at construction site with local landscape and cultural relics would cause uncomfortable sensory effect		construction plan. Where possible, construction schedule shall avoid the Labor Day, the National Day, and peak summer time in July and August. When necessary, road guidance shall be supported. ② Construction material storage site, temporary roads, and the transportation of materials and equipments shall not be located in the area of cultural protection agency, and shall be set away from a side of it. ③ Construction personnel are not allowed to access to the protected area of cultural relics; behaviors that will damage cultural relics shall be banned ④ Dust and noise barriers set near cultural relics at construction site shall be heightened; ⑤ The color and appearance of the outer wall on the temporary dust and noise barriers at construction site shall be coordinated with local cultural relics, ensuring the integrity of urban landscape.			Unit, county PMO, Local Environmental Protection Bureau

Table 12-7 General Environmental Impact and Mitigation Measures during Operating Period

Item	Environmental Elements		Mitigation Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 10,000)
The operation noise of water pump equipment etc during the operation period of heat exchange station	Natural Environment	Acoustic Environment	① Choose environmental protection equipment with low noise, and keep maintenance and repair regularly. ② The in and out pipeline of pump should be vibration absorber throat pump. The foundation of pump should adopt vibration reducing measures. Acoustic shield should be added to reduce noise. ③ The doors and windows of heat exchange stations should be sound proof doors and double airtight sound proof windows. ④ The buildings of heat exchange stations should adopt sound proof structure. ⑤ The newly built heat exchange station equipment shall be in reasonable layout.	Operation Unit	Construction Unit, Local Environmental Protection Bureau	Third-party Monitoring	L_{Aeq}	**74**
Operation Period	Environment and security risk	Risk of pipeline network leakage accident	A) Conduct shockproof design by taking the earthquake in more than VII level as safety factor, make sure the pipeline could bear the menace of VII level earthquake. The laying of pipe network shall avoid unfavorable area such as soft soil area and earthquake fracture zone etc. B) Prohibit setting up mordant storage yards in the area where the pipeline is laid. C) Prohibit excavating and constructing building over the loan of pipe above and nearby the pipeline, prohibit engaging other production activities above and nearby the pipeline.	Operating Enterprise	Construction Unit, local Environmental Protection Bureau, Safety Supervision Bureau, Construction	/	/	**158.2**

Item	Environmental Elements		Mitigation Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 10,000)
			D) Conduct timed checking to the heat supply pipeline, and timely repair the pipeline once breakdown occurred. E) Clean the pipeline regularly, exclude hydrops and dirt within the pipeline to relieve corrosion within the pipeline. F) Transact measurement for the wall thickness of pipeline in every three years, timely repair or exchange the seriously thickness-reduced pipeline to avoid the occurrence of pipe explosion accident. G) Examine the safety protection system of pipeline in half a year, add pressurization valve device etc. to make sure the pipeline can be safely disposed at the overpressure, which will reduce the influencing scope of harm to minimum; H) Prohibit constructing within the protection scope of pipeline; I) The signs in the crossing point of railway, road and river should be clear, explicit and the settings shall be clearly seen from different orientation and angle; J) Enlarge pipeline walking frequency, improve the effectiveness of pipeline walking; examine construction area of pipeline every day, check the situation of earth surface, and pay attention to the activities of staff in this area. Timely stop the influential behaviors for pipeline safety, adopt relevant measures and report it to superiors; K) Examine the pipeline passing through rivers, railways, roads and villages etc sensitive area once every day; L) Pay special attention to the safety of pipeline locating at river crossing section during flood period; M) Develop emergency plan for environmental risk and periodically exercise the plan.		Management Authority			
		Risk of boiler explosion accident	A) Keep the stability of boiler load, avoid abruptly lowering load that results in air pressure rising. B) Keep the sensitivity and reliability of safety valve, prevent malfunction of safety valve. Let off the safety valve by manual once at certain period and periodically make automatic vent test. Once the action is dull, timely restoration must be made. C) Periodically check the pressure meter to make sure the accurate indication of pressure meter. Once the indication is inaccurate or action is abnormal, the pressure meter must be replaced in time. D) Avoid water shortage. Control the normal water level, regularly flushing the water level, periodically maintain and examine water level alarm device or overtemperature alarm device. E) Avoid scale depositing. Correctly use water treatment equipment to ensure the water quality meeting standard. Carefully dispose the sewage and timely clear					

Item	Environmental Elements		Mitigation Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 10,000)
			scale deposit and water dregs. F) Adopt effective water treatment and deoxygenation measures to ensure the qualification of water supply and water quality. Strengthen maintenance work of the boiler, timely clean ash, paint antirusting paint and keep internal drying of the boilder. G) Keep stable burning, prevent abrupt cold and hot of the boiler. Strengthen the checking for the stress concentrated part such as end socket and edge etc. Once crack or grooving is found, timely repair must be made. H) Adopt reasonable design, ensure the manufacturing and installation quality.					
		Inspection defects risk of heat exchange station operation	A) Choose qualified heat insulating materials and do corrosion prevention work well. Choose qualified valve and compensator etc. B) There are specially-assigned persons to guard and fence must be set up around the wellhead when indoor operation is operated. The workers shall pay attention to safety and do protective measures well to avoid the occurrence of falling accidents when they examining in the well. The workers in high altitude must be equipped with qualified protective products. C) The ground protection of electrical equipment must be done well to avoid electrification of shell. Examine the electrical equipment before transacting maintenance work. The workers must be equipped with necessary labor protective products, and the protective products are within qualified period of test.					
		Management Defect Risk of Natural Gas Use	A) Number main natural gas equipment, valve, bleeder and pipeline support etc., and the numbers shall be marked in obvious place. The management agency shall possess process flow diagram of gas, and the equipment No. and its accessory device No. shall be marked on the diagram; B) The reliable partition device must be set at the leading point (excluding hot boiler natural gas pipeline) of branch pipe of the main pipeline where the natural gas distributed; C) If the combustion apparatus adopts forced air supply burner, the natural gas branch pipe shall be installed with check device or automatical isolating valve. Set up explosion venting membrane in air conduit; D) Install low pressure alarm device to natural gas and air conduit; E) Set up bleeder at the terminal of air conduit, and the bleeder shall be extended to the outside of factory; F) Reliable isolating device shall be set up in normally maintained parts; G) Set up bleeder in the following positions: (1) The top of natural gas equipment and					

Item	Environmental Elements		Mitigation Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 10,000)
			pipeline; (2) The terminal of natural gas pipeline and horizontal device; (3) The front parts of natural gas and pipeline as well as within 0.5 m from the natural gas main pipeline pipeline net isolating device to the front and behind branch pipe can not be set up with bleeder, however, if it is more than 0.5m, the air releasing head shall be set; H) The bleeder orifice shall be 4 m higher than natural gas pipeline, equipment and walking board and no less than 10 m from the ground. With respect to the pipe orifice of bleeder in natural gas pipeline and equipment within the factory or within 20 m away from the factory shall be 4m higher than the roof. If the factory is very high and the bleed is infrequently used, the pipe orifice height can be lowered properly, but it shall 4m higher than the natural gas pipeline, equipment and walking board. Should not diffuse natural gas in the factory or to the factory; I) Bleeder orifice shall adopt rain-proof and anti-clogging measures; J) Weld stiffener at the root of bleeder and fixed with rope at the top; K) The bleeders of natural gas equipment shall not be jointly used, excluding the bleeders whose air diffusing is collectively disposed; L) The equipment and pipeline that need steam and nitrogen to displace natural gas or air at the time when stopping or delivering natural gas shall be installed with steam or nitrogen pipe orifice; M) The steam or nitrogen pipe orifice shall be installed at the top or side of natural gas pipeline, and cock or sluice valve shall be installed in pipe orifice. In order to avoid the natural gas entering into steam or nitrogen pipeline, the steam or nitrogen pipeline will be connected with natural gas pipeline only when steam or nitrogen is passing, and this connection shall be stopped or the blind plate shall be blocked when steam or nitrogen is stopped; N) The main natural gas pipeline within the factory shall be marked with obvious natural gas flow direction and types signs; O) All possible natural gas leaking parts shall be hung with reminding alarm signs; P) The natural gas regulator station shall be set in the open air or within independent factory, the open air regulator station shall have physical enclosing wall, and the distance between the enclosing wall and pipeline shall no less than 2m; Q) The operating room of regulator station shall be equipped with pressure meter, flow meter, high and low pressure alarm and telephone. The operating room shall be separated with regulator station, and two outward opening doors shall be set; R) The pressure regulation system shall have safety valve, and it shall meet current stipulations related to the management of pressure vessel.				
		Risk of	A) Once natural gas burning accident occurred, the natural gas protective station shall					

Item	Environmental Elements		Mitigation Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 10,000)
		Natural Gas Ignition	be immediately informed meanwhile the firefighting team shall be informed of on-site aid; B) If the natural gas pipeline with diameter more than 100 mm, the valve shall not be directly closed, and the pressure meter shall be installed. Gradually close the valve and lower pressure according to pressure, and inject a large amount of steam or nitrogen into the natural gas pipeline to put out the fire. The natural gas pressure within natural gas pipeline shall no lower than 100 Pa at least; C) The fire extinguishment by high pressure water can be adopted. However, the abrupt water spray is forbidden when the equipment is burned red to avoid deformation and fracture of pipeline; D) If the interior of natural gas equipment is caught fire, firstly, confirm whether there are persons in the equipment, if there is no person, the inlet and bleeder shall be immediately closed, and put out the fire by injecting large amount of steam or nitrogen.					
		Risk of Natural Gas Explosion Accident	A) The boiler ignition work must be transacted according to operating procedure; B) Before ignition work, open the flue shutter, boiler door and wicket, dispose residual natural gas by adopting natural convection; C) The flue of newly built and rebuilt furnace kiln must possess certain suction, if the smell of smoke is not dry, the flue must be dried firstly; D) With respect to the ignition work, firstly ignite the fire and then deliver natural gas. The ignition of boiler generally adopts the mode of ignition tube. Under special circumstance, the natural gas ignition work can be delivered after set up firewood in the furnace kiln or ignite ignition objects; E) After the failure of first ignition, the air blower and flue shutter shall be opened to blow away the residual natural gas in boiler. Upon test, if it is qualified, the second ignition can be started; F) The ignition work must be transacted when the pressure of natural gas is stable; G) With respect to the forced-draft furnace kiln, the air blower and flue shutter shall be opened before the ignition work to blow away the residual natural gas in flue shutter. The ignition work shall be started after turning down the flue shutter. Gradually open the flue shutter and adjust air volume after all burner nozzles are totally ignited; H) The ignition work of all furnace kiln shall start from the terminal burner nozzle in orders. Once natural gas explosion accident occurs, the preferential disposal is as follows: A) Promptly cut off the source of natural gas, dispose the residual natural gas to avoid					

Item	Environmental Elements		Mitigation Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 10,000)
			the extension of accident; B) If burning accident is produced by the explosion of natural gas, it shall be disposed according to burning accident of natural gas; C) If natural gas poisoning accident is produced by the explosion of natural gas, it shall be disposed according to poisoning accident; D) The burnt personnel in the accident shall be immediately sent to hospital for burn for treatment, and washing and wipe are forbidden to avoid damaged skin or infection; E) Pay attention to the wounded whether they have trauma when fleeing from fire ground when rescuing the burnt personnel in natural gas explosion accident. Pay attention to the wounded to avoid aggravating injury once trauma occurred.					
		Precaution and Decrease of Natural Disaster Accident	A) The engineering will be transacted with earthquake proof preset according to the earthquake proof preset intensity and ground motion parameter stipulated in GB50011-2001, GB50032-2003. The periodic value of response spectrum characteristic of ground motion acceleration separately corresponded by different site shall be confirmed by periodic partition. B) Establish and perfect earthquake and disaster prevention system according to the principle of "Prevention First, comprehensive prevention". The planning, design and construction of all buildings and structures shall be conducted according to relevant earthquake resistant regulations and the earthquake ability of all buildings shall be improved. C) The layout of pipeline net shall avoid earthquake fault zone. Relevant engineering measures must be adopted if the construction is conducted in disadvantage area of building earthquake prevention, and the construction in earthquake prevention dangerous area is forbidden. D) Certain persons shall be left in heat source plant and heating station to evacuate shelter and meet the requirement of urgent evacuation of personnel by combining with city planning.					

Table 12-8 Environmental Impacts and Mitigation Measures For Runtime Characteristics (Personality)

Influence factor	Pollution source (and/or sensitive point)	Special environmental impact	Mitigation Measures	Budget (CNY 10,000)	Implementer	Supervisor
Acousti	For the 201 sensitive receptors surrounding the	Increase surrounding	① Choose environmental protection equipment with low noise, and	6	Operation	Construction

c Environment	heat exchange substations in the four subproject cities/counties including school, hospital, residential area and office building, mainly operating noise of pumps and other equipment	noise levels,and affect people's sense of hearing	keep maintenance and repair regularly. ② The in and out pipeline of pump should be vibration absorber throat pump. The foundation of pump should adopt vibration reducing measures. Acoustic shield should be added to reduce noise. ③ The doors and windows of heat exchange stations should be sound proof doors and double airtight sound proof windows. ④ The buildings of heat exchange stations should adopt sound proof structure. ⑤ Distribute equipment in the station rationally to make the high-noise devices away from the side of particularly sensitive targets; ⑥ Strengthen operational management and maintenance of facilities, and increase maintenance frequency of sound proof equipment to ensure stable operation of equipment and facilities		Unit	Unit, Local Environmental Protection Bureau
Risk Management	For the particularly sensitive noises surrounding Xingtai Primary Heat Station and Zhangjiakou pressure isolation substation, mainly to prevent the risk of explosion.	Explosions endanger the lives and property	Strengthen safety awareness and management, inspect regularly, and observe regulations and discipline	108	Operation Unit	Constructor, safety supervision bureau

Table 12-9 Follow-up Actions to Be Taken by Heating Sources

Environment Component	Pollution Source	Follow-up Actions	Budget CNY 10,000	Monitoring Parameter	Monitoring Frequency	Implementation	Supervision
Air	Pingshan subproject heating source – Xibaipo Power Plant coal-fired boiler Air impact of fume, SO2 and NOx	① Renovation of desulfurization system of No.1-4 power generation units; ② Improvement of wet dust removers of No.1-4 power generation units; dust removing system renovation of No.5-6 power generation units; ③ Denitrificaiton system renovation of existing power generation units by adding standby catalyst layer and expanding treatment capacity.		Fume ≤ 5mg/m^3 SO2 ≤ 35mg/m^3 NOx ≤ 50mg/m^3	Continuous online monitoring: once/hour; Monitoring by EPB: once/quarter	Heating facility: Xibaipo Power Plant	Pingshan County EPB, Subproject PMO
Air	Xingtai subproject heating source – China Coal Risun Company Air impact of fume, SO2 NOx and dust	Construction/renovation to be finished by the end of 2015: Waste gas capture and treatment facility: ① Construction of 2 sets of coke oven fume heat boilers (6t/h) ② One enclosed coal storage structure ③ Construction of acid-washing + water-washing system for treatment of waste gas from desulfurization regeneration tower, foam tank and ammonia sulfate process; ④ Upgrading of existing 9 dust removing equipment to 6 sets of bag-type dust removing towers	6285	Fume ≤ 30mg/m^3 SO2 ≤ 100mg/m^3 NOx ≤ 500mg/m^3 Dust ≤ 50 mg/m3 (new standard, 2015)	Self-monitoring: once/day; Monitoring by EPB: once/quarter	Heating facility: China Coal Risun Company	Xingtai City EPB, Subproject PMO
		Construction of new facilities to be completed by the end of 2015: ① Upgrading of existing conventional wet quenching coke system of No.1-3 coking ovens to innovative 150t/h quenching coke system (innovative low-moisture quenching coke system); ② Construction of 1 set of 170t/h dry quenching coke equipment, one 91 t/h residual heat utilization boiler, and 1 set of 25 MW extraction power generator; and ③ Construction of 1 set of 150 m^3/h "ultrafiltration + nanofiltration" wastewater treatment equipment.	25630				

Table12-10 Environmental Monitoring Plan For Chengde Subproject

Time Interval	Monitoring Object	Monitoring Program	Monitoring Location	Monitoring frequency	Cost Estimate (CNY 10,000)	Monitoring Agency	Responsible Agency	Supervisory Agency	Applicable Standards
Construction period	Noise	L_{Aeq}	Boundary of construction site	Once during construction	**5.0**	Entrusted and qualified monitoring agency	Heating Group, Chengde City	Environment Protection Bureau, Chengde City	Acoustic *Environmental Quality Standards* (GB3096-2008) Category-2 standards, ≤ 60 in daytime, ≤ 50 at night [unit: dB (A)]
	Atmosphere	TSP	Boundary of construction site	Once during construction	**10.0**				*Ambient Air Quality Standard* (GB3095-2012) standard annual average 2-hour average≤200,24 ≤300 (ug / m^3)
Operating period	Noise	L_{Aeq}	The heat exchange station 1m	Heating period , once	**/**				*Emission Standard for Industrial Enterprises Noise* (GB12348-2008) Class 3 functional areas corresponding standard
Operating period	SO_2, NOx, dust		Heat power plant boiler chimney	Continuous online monitoring, once/hour; External monitoring by local EPB: once/quarter	**/**		Heat source enterprise		*Emission Standard of Air Pollutants in Thermal Power Plant* GB13223-2011 Soot≤30 、 SO2≤200 、 NOX≤100(mg/m^3)

Note: (a) 50% of general environmental sensitive ojbects and all the special sensitive receptors can be selected for noise monitoring of heating substations during operation; and (b) Technical Specifications for Continuous Monitoring of Thermal Power Plant Fume Emission (HT/T 75-2001) will be followed for heating source monitoring.

Table 12-11 Environmental Monitoring Plan For Pingshan Subproject

Time Interval	Monitoring Object	Monitoring point location	Monitoring Program	Monitoring frequency	Cost Estimate (CNY 10,000)	Monitoring Agency	Responsible Agency	Supervisory Agency	Executive standards and norms
Construction period	Noise	Individual heat exchange stations, typical pipeline area and near settlements, hospitals, schools.50 locations in total	L_{Aeq}	8:00~10:00, 14:00~16:00,20:00~22:00 Mnitor once a month for two continuous days at peak construction period daily monitoring period 8:00 to 10: 00,14: 00 ~ 16: 00, 20: 00 ~ 22:00	**10.0**	Entrusted and qualified monitoring agency	Pingshan heating company	Enviromen t Protection Bureau, Pingshan County	Acoustic *Environmental Quality Standards* (GB3096-2008) Category-2 standards, ≤ 60 in daytime, ≤ 50 at night [unit: dB (A)]
Operation Period	Power Plant	Each chimney	SO_2, NOx, dust	Continuous online monitoring, once/hour; External monitoring by local EPB: once/quarter	/		Xibaipo Power Plant		*Emission Standard of Air Pollutants in Thermal Power Plant* GB13223-2011
	Wastewater	Drainage Plant	PH	Heating period，monitor once	/		Xibaipo Power Plant		*Quality Standards for Sewage Discharged into the City Sewer* (CJ343-2010) Class B pH 6.5-9.5, COD≤500, Total Dissolved Solids≤2000, Ammonia≤45(mg/l)
			COD		/				
			Total Dissolved Solids		/				
			Ammonia nitrogen		/				
	Noise	36 heat exchange stations	L_{Aeq}	Heating period，monitor once in daytime and another in night	**7.2**		Pingshan heating company		*Sound Environmental Quality Standards*(GB3096-2008)Class B

Note: (a) 10-20% of general environmental sensitive ojbects and all the special sensitive receptors can be selected for noise monitoring of heating substations during operation; and (b) Technical Specifications for Continuous Monitoring of Thermal Power Plant Fume Emission (HT/T 75-2001) will be followed for heating source monitoring.

Tbale 12-12 Environmental Monitoring Plan For Xingtai Subproject

Time Interval	Monitoring Object		Monitoring Program	Monitoring point location	Monitoring frequency	Cost Estimate (CNY 10,000)	Monitoring Agency	Responsible Agency	Supervisory Agency	Executive standards and norms
Construction period	Atmosphere		TSP	Boundary of the construction site (20 special sensitive points such as Yihai Garden, Fengchao Garden, Quandu City)	At least one supervision during construction for each sensitive point	**3**	Entrusted and qualified supervision agency	Xingtai Xuyang Anneng Heating Power Co., Ltd.	Enviroment Protection Bureau, Xingtai City and Enviroment Protection Bureau, Xingtai County	*Ambient Air Quality Standards* (GB3095-2012) Class 2 Standard (TSP annual average standard is 200μg/m^3， average in 24 hours is 300μg/m^3)
	Noise		Equivalent continuous A-weighted sound level	Boundary of the construction site (20 special sensitive points such as Yihai Garden, Fengchao Garden, Quandu City)	At least one supervision during construction for each sensitive point	**4**				*Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523-2011) (Daytime standard value is 70dB(A), night standard value is 55dB(A))
	Diligent enterprise supervision	Zhongmei Xuyang	SO_2, NOx, smoke, dust	Coke oven, dirt catcher at ground station, vertical furnace, dirt catcher for coke transport and screen, smashing exit	Self-monitoring, once/day; External monitoring by local EPB: once/quarter	**/**		Heat source enterprise		Standard limiting value in the *Pollution Discharge Standards for Coking Chemical Industry* (GB16171-2012) Table-5
		Xingtai Xuyang Chemical Engineering	CO, SO_2, non-methane, total hydrocarbons and particulate matters	Sampling hole at exhaust funnel and 10 m away from the factory boundary		**/**				*The Integrated Emission Standards of Air Pollutants* (GB16297-1996) Table-2 secondary standard, *The Emission Standards of Stationary Pollution Source Carbon Monoxide* (DB13/487-2002) Table-2 secondary standard
Operating period	Noise		Equivalent continuous A-weighted sound level	Facility site boundary (144 thermal stations and one Primary Heat Station)	At least one supervision in the heating period (one day and one night)	**29**		Xingtai Xuyang Anneng Heating Power Co., Ltd.		*Emission Standard for Industrial Enterprises Noise* (GB12348-2008) Class 3 functional areas corresponding standard (Daytime standard value is 65dB(A)， night standard value is 55dB(A))
	Diligent enterprise supervis	Zhongmei Xuyang	SO_2, NOx, smoke, dust	Coke oven, dirt catcher at ground station, vertical furnace, dirt catcher for coke transport and screen,	Self-monitoring: once/day; External monitoring by local EPB: once/quarter	**/**		Heat source enterprise		Standard value in the *Pollution Discharge Standards for Coking Chemical Industry* (GB16171-2012) Table-5

	ion			smashing exit						
		Xingtai Xuyang Chemical Engineering	Phthalic anhydride condensation exhaust and pollutant concentrations around the factory	Sampling hole at exhaust funnel and 10 m away from the factory boundary		/				*The Integrated Emission Standards of Air Pollutants* (GB16297-1996) Table-2 secondary standard, *The Emission Standards of Stationary Pollution Source Carbon Monoxide* (DB13/487-2002) Table-2, Class 2 standard

Note: 10% of general environmental sensitive ojbects and 20% of the special sensitive receptors can be selected for noise monitoring of heating substations during operation.

Table 12-13 Environmental Monitoring Plan For Zhangjiakou Subproject

Time Interval	Monitoring Object	Monitoring Program	Monitoring point location	Monitoring frequency	Cost Estimate (CNY 10,000)	Monitoring Agency	Responsible Agency	Supervisory Agency	Executive standards and norms
Construction period	Atmosphere	TSP	Boundary of construction site	At least one supervision during construction for each sensitive point	**9**	Entrusted and qualified supervision agency	Zhangjiakou Dongyuan Heating Power Co., Ltd.	Zhangjiakou Enviroment Protection Agency	*Ambient Air Quality Standards* (GB3095-2012) Class 2 Standard TSP≤300 (μg/m^3)
	Noise	Equivalent A-weighted sound level	Boundary of construction site	At least one supervision during construction for each sensitive point	**11.5**				*Noise limits For Construction Site* GB12523-90 [unit: dB (A)] Earthwork stage：daytime≤75，night≤55 Piling stage：daytime≤85， construction is prohibited at night Construction stage：daytime≤70，night≤55 Renovation phase：daytime≤65，night≤55
	Diligent enterprise supervision	SO_2, NOx, smoke	Chimney of coal-fired boiler	Continuous online monitoring, once/hour; External monitoring by local EPB: once/quarter	**/**		Heat source enterprise		The standard limiting value in *The Emission Standards of Air Pollutants for Heat-Engine Plants* (GB13223-2011) Table-1. NOx≤200, SO_2≤200, dust≤30 (unit: mg/m^3)
Operation period	Noise	Equivalent A-weighted sound level	Facility site boundary	At least one supervision in the heating period (one day and one night)	**4**		Zhangjiakou Dongyuan Heating Power Co., Ltd.		*Standard Noise Limit For Industrial Enterprises* (GB12348-2008), daytime≤60, night≤50 [unit: dB (A)]
	Atmosphere	SO_2,, smoke	Dongyuan Heating gas boiler chimney	At least one supervision in the heating period	**2**		Zhangjiakou Dongyuan Heating Power Co., Ltd.		*Emission Standard of Air Pollutants in Thermal Power Plant* (GB13223-2011) relevant standard limits for gas-fired boilers, SO_2≤35mg/m^3, dust≤5mg/m^3
	Sewage	PH value, suspended solids and total Dissolved Solids	Heat exchange station softened water drainage system	At least one supervision in the heating period	**3**				*Quality Standards For Sewage Discharged into the Municipal Drainage pipeline* (CJ343-2010) Class B standard limit: PH：6.5~9.5, Suspension≤400, Total Dissolved Solids≤2000(mg/L)
	Diligent enterprise supervision	SO_2, NOx, smoke	Chimney of coal-fired boiler	Continuous online monitoring, once/hour; External monitoring by local EPB: once/quarter	**/**		Heat source enterprise		The standard limiting value in *The Emission Standards of Air Pollutants for Heat-Engine Plants* (GB13223-2011) Table-1. NOx≤200, SO_2≤200, dust≤30 (unit: mg/m^3)
NOTES：Residential area includes familay domitory building No.3 of China Unicom, familay domitory buildings of 251 hospital, residential area for trafic police of south community in Gongren village, Zhangheng Xincheng,									

Time Interval	Monitoring Object	Monitoring Program	Monitoring point location	Monitoring frequency	Cost Estimate (CNY 10,000)	Monitoring Agency	Responsible Agency	Supervisory Agency	Executive standards and norms
residencial buildings for city trade and Industry Bureau, Rongchen Zhuangyuan, Meihuixian residential area，Victoria Square area, Pengyue Longcheng，Yian Jiayuan, Aolin Xincheng, residencial buildings for Tobacco Monopoly Bureau, familay domitory building for Telecom, Zhongsheng Zhicheng, Lihuayuan residential area, Yard 16 on Shengli road, familay domitory buildings of Coal Factory, Guojin Shidai residential area, residencial buildings No. 43 & 49 on Shengli road，Shengshi Huating area, residencial buildings No. 4,14,18,28,32,38 on Nouth Shengli Road, Huanyuan residential area，Fuanjie residetial area, residencial buildings of Department of Transportation; Schools; Miaomiao nursery in High-tech Zone, Weihua primary school；Office type institution: Urban Construction Bureau, Qiaodong district，Zhangjiakou，Qiaodong branch, Land and Resources Bureau, Zhangjiakou, Radio Authority, Zhangjiakou, Hebei Province, People's government, Qiaodong district, Zhangjiakou City, Education Bureau, Qiaodong District, Zhangjiakou, Employment Service Bureau, Zhangjiakou City and Charhar Martyrs.								

Note: (a) 20% of general environmental sensitive ojbects and the special sensitive receptors can be selected for noise monitoring of heating substations during operation; and (b) Technical Specifications for Continuous Monitoring of Thermal Power Plant Fume Emission (HT/T 75-2001) will be followed for heating source monitoring.

12.6 Environmental Management Training

Environmental management training is intended to ensure the environmental management work smoothly and effectively so that the relevant management personnel at all levels and the personnel in charge shall be familiar with the content and procedures of the environmental management, improve the environmental management capacity for the environment managers and ensure that the environmental protection measures, monitoring plan and reporting shall be effectively implemented.

Survey and observation of construction units and PMOs of each sub-project shows that those units have not been engaged in the management and implementation of loan projects of the World Bank. They need a detailed, clear understanding of the security policies and environmental management requirements of the World Bank, as well as specific practices and procedures. For this reason, in the implementation of the project, specialized training shall be carried out to improve their mangagement capabilities. Besides environmental management training, personnel of these projects shall also participate in training activities with wider content which can strengthen the capacity.

Objects of Environmental management training are: all levels of sub-project construction unit, subproject management office, environmental supervision personnel and contractors.

Environmental management training content includes:

1) Mastery and use of World Bank's environmental policies and domestic environmental laws and regulations and, environmental standards；

2) World Bank's Environmental management mode and environmental provisions in loan agreements and project agreements；

3) Implementation and management of the sub-project EMP and monitoring plan；

4) Responsibilities of environmental managerial personnel；

5) Pollution control technology during construction and operation；

6) Safety protection and practices for demolition of small boiler (such as insulation materials are harmful during the event)；

7) Environmental Management Report or preparation of information, including monthly environmental supervision reports and quaterly and annual reports of construction units.

Detailed training program and related cost estimates，See Table**12-14**.

Table 12-14 Environmental Management Training Program and Cost Estimation

No.	Training Content	Participants	Chengde		Pingshan		Xingtai		ZhangJiakou	
			Days of training	Expenses (CNY 10,000)	Days of training	Expenses (CNY 10,000)	Days of training	Expenses (CNY 10,000)	Days of training	Expenses (CNY 10,000)
1	World Bank environmental policies and domestic environmental regulations and standards	PMO at different levels, project construction unit, environmental supervisor, contractor	3	3	2	2	3	8	1	1
2	A) World Bank environmental management, model, environmental provisions in loan agreement and project agreement; B) Implementation and management of EMPs and monitoring plans C) Responsibilities of environmental management staff	PMO at different levels, project construction unit, environmental supervisor, contractor	1	1	2	2	4	10	1	1
3	Pollution control technology during construction and operation safety protection and practices for the removal of small boiler	PMOs at all levels, project construction unit	3	3	1	1	3	13	1	1
4	Environmental reporting and data preparation	PMO at different levels, project construction unit,	2	2	1	1	3	10	3	3

		environmental supervisor, contractor								
Subtotal：			**9**	**9**	**6**	**6**	**13**	**41**	**6**	**6**
Total：			**Days for training: 34; Total estimated cost: CNY 620,000**							

12.7 Environmental Protection Management Measures Budget

Environmental protection measures budget includes charges of mitigation of environmental impact, safety management, measures implementation, management training, supervision, etc. during construction and operation.Thereinto, Among them, the environmental monitoring cost estimates, see Section 12.5; environmental management training cost estimates, see Section 12.6; environmental impact mitigation and environmental safety management measures cost estimate, shown in Table 12-15. All of these costs are included in the total investment estimate.

Table 12-15 Environmental Impact Mitigation and Environmental Safety Management Measures Estimate Table

Project Stages	Parameters	Investment for subproject(CNY 10,000)				Subtotal (CNY 10,000)
		Chengde Subproject	Pingshan Subproject	Xingtai Subproject	Zhangjiakou Subprojcet	
Construction period	Construction Noise	**180**	**3**	**201**	**175**	**559**
	Construction Dust	**135.2**	**5.8**	**126**	**99**	**366**
	Construction Waste	**48.7**	**1**	**40**	**46**	**135.7**
	Solid Waste	**28.5**	**1**	**30**	**32**	**91.5**
	Ecological environment	**38.6**	**45**	**31**	**47**	**161.6**
	Water and soil conservation	**74.7**	**0**	**46**	**60**	**180.7**
	Social Impact: Living and social activities	**78.6**	**0**	**80**	**77**	**235.6**
	Transportation, commercial activities	**5**	**3**	**71**	**54**	**133**
	Cultural relics	**34**	**0**	**0**	**0**	**34**
	Environmental Risk Management	**0.2**	**0**	**20**	**0**	**20.2**
Operation period	Heat exchange station noise	**10**	**17**	**46**	**7**	**80**
	Environmental risks and operational safety risk management	**27.8**	**11**	**75**	**58**	**171.8**
	Occupational Health	**13.4**	**3**	**201**	**13**	**26.4**
Subtotal (CNY 10,000)		**674.7**	**86.8**	**766**	**668**	
Total (CNY 10,000)		**2195.5**				

12.8 Public Consultation

12.8.1 Continuous Public Consultation

Public consultation is a continuing need for the activities carried out at each stage of the project, including project preparation, construction and operation period.

In accordance with national EIA requirements and World Bank requirements for public consultation during project preparation, two rounds of public consultation have been conducted for each subproject during project preparation, which include a series of public consultation activities. Form, content and result of public consultation in preparation stage, see Section 11 of this report.

Public consultation activities are still required every year in environmental sensitive points during project construction period and the first 2 years of operation period, in order to seek public opinions and take further mitigation measures as necessary.

During construction, the site should be used in the form of notice to inform the public: the construction period, the operating time, the environmental impact of the use of mitigation measures; and construction units, construction units, environmental protection unit name and contact name, contact telephone number. Timely feedback on comments made by the public during the construction and coordination of construction activities, make the environmental

impact to a minimum.

In the project operation period, you can visit the site or in the form of discussion to solicit opinions and suggestions of affected residents and the community, and take further mitigation measures if necessary.

Table 12–2 Continuous Public Consultation Plan

Agency	Form	Frequency	Content	Participant
A. Project construction period				
Local PMO, PIU, contractor	Public consultation in seminars and site visits	At least once a year	Implementation and effectiveness of mitigation measures, if necessary, update the mitigation plan; construction impacts; suggestions and recommendations	Residents' representatives from project service community and society
Local PMO, PIU, contractor	Expert forum and press conference	According to needs of public participation	Mitigation measures and the observations and recommendations of implementation; public opinion.	Experts and medias in all fields
B. Project operation period				
Local PMO, PIU, operation unit	Public consultation and site visits	Once a year at first two years	The effect of mitigation measures; operational impacts; suggestions and recommendations	Residents' representatives from project service community and society
Local PMO, PIU, operation unit	Expert forum and press conference	According to needs of public participation	Comments and suggestions for run impacts; public opinion.	Experts and medias in all fields

12.8.2 Complaints and feedback mechanism

Grievance readiness mechanism

In the construction and operation period, PMOs and PIUs at all levels should assign a person to be responsible for accepting complaints from the affected people, public telephone complaints, subject to public inquiries and complaints.

Complains Accept Office shall start accepting complaints in one week after the project implementation, while openning complaints hotline and complaints mailbox.

If the residents of the project area dissatisfied with the EMPs, or the project construction and operation affect the quality of the local environment, people can appeal to the PIU or local PMO by an oral or written complaint. For reasonable request or suggestion, usually resolve or implement in 1-2 weeks after receiving a complaint.

If the complainant is dissatisfied with the process, after receiving the results the complainant may complaint or report to the local environmental protection bureau. If the complainant is dissatisfied with the results of the local environmental protection bureau, they may apply for administrative reconsideration or bring a lawsuit to the local court.

Feedback Mechanism

Appeals feedback mechanisms include planning of recording, tracking and regular reporting system.

(1) Standardized recording: complaint record includes: the basic situation of the complainant,

basic situation of the complainant incident, the basic situation of the replyer, the solution and results.

(2) Track: pay a return visit to the complainant whether the complaint incident is handled, the complainant is satisfied with the effects of treatment and so on.

(3) Periodic reports: the problem of the complainant should be regularly reported to higher level management office by written, and write into the next year's plan in order to avoid similar incidents.

12.9 Environmental Reporting

In the project implementation process, local PMO and project implementation unit should record project progress, the implementation of the management plan, environmental quality monitoring results, the loan documents of compliance and other environmental provisions, and report them in accordance with the specified time to Provincial Project Management Office.

The main report includes：

- Monthly Construction Supervision report；
- Implementation of mitigation measures, existing problem, improvement and implementation effect；
- Environmental monitoring report, includes pre-construction baseline monitoring, monitoring during the construction period and monitoring during the operation period;
- When monitoring results is not compiant, there shall be explaination for non-compliance reasons and suggested improvement actions;
- Environmental complaints and results record；
- The frequency of reporting project progress shall be synchronized with the project progress report, which usually be quarterly or semi-annually base.

13. Conclusions and Suggestions

13.1 Conclusions of Comprehensive Assessment (Assessment for Current Status and Impacts)

The four sub-projects have analyzed the current status of the atmosphere, acoustic environment, solid waste, water environment, ecological environment and social environment of the relevant cities and counties. The conclusion is that except that the environmental quality of atmosphere is unsatisfactory, the environmental qualities of all other factors can meet the requirement of functional compartments.

The four sub-projects have also forecasted, analyzed and commented on the influences to the environmental elements from construction and operation of the sub-projects. The basic conclusions from the four sub-projects are unanimous, that is:

1) The major influences of the construction period upon the atmosphere are raise dust and a little amount of exhaust gas. All these influences are temporary, discontinuous, and will vanish with the completion of the construction. These influences will be negligible if mitigation measures are taken. The influences on the acoustic environment are also discontinuous and temporary and can be negligible if mitigation measures are taken. The influences on the water environment are very limited. If mitigation measures are taken, these influences tend to be zero. The construction period has little bad influence on the ecological environment. The influences on the social environment are a little amount of temporary land occupation and an extremely little amount of permanent land occupation (The primary exchange station of heat supply in Xingtai and the pressure insulation and heat exchange station of Zhangjiakou), influences on the traffic and residents around the construction site, and the re-employment of the temporary workers of some small boiler houses to be closed (dismantled). The construction period does not involve land acquisition or change of land status, so its influences on the land, local traffic and residents and businesses are very small if mitigation measures are taken. The problem of re-employment of the temporary workers of the small boiler houses can also be properly settled. Their livelihood will not be affected. The conclusion is that the influences from the construction period are very small or insignificant.

2) The major influences from the project operation period are the influences of mechanical operation on the acoustic environment. This issue was taken into full account during the design stage and construction stage. Therefore, after the projects putting into operation, they will have little influences on the acoustic environment. Moreover, when administrative measures are fully taken, the environmental safety risks of the operation period can also be lowered to the minimum.

The final conclusion is that the construction of this project (World Bank Loaned Hebei Clean Heat Project) has no irreversible bad influences according to the analyses on the atmosphere, acoustic environment, solid waste, water environment, ecological environment and social environment. This project will have little effect on the environment after corresponding mitigation measures are taken.

13.2 Suggestions

Measures of pollution prevention and influence reduction in the Environmental Management Plan shall be fully implemented during the construction and operation period of this project. The requirements in the Environmental Management Plan shall be fulfilled and clean production shall be actively promoted.

Before construction, site inspections and supervisions shall be fully made along the construction area. The formulated measures and administrative requirements shall be fulfilled for avoiding problems occurred during the construction period.

Taking into full account the local rain recurrence interval, the pressure of flood control networks and the level of shallow groundwater, implement flood prevention measures for the construction period and try to avoid the influences on the groundwater of the construction site.

The Chengde PIU shall strengthen their communications with the local cultural relics units and optimize the hues and appearances of dustproof enclosures, sound insulating shields and other striking construction equipments so that the construction site can be consistent with the neighboring environment and accord with the requirements of historical and cultural relics.

Appendix A

Environmental Protection Management Regulations on Heating Exchange Station and Pipeline Laying Construction

Annex A: Regulations on Environmental Protection of Heat Exchange Station and Pipeline Laying Construction

In accordance with the requirements of environmental screening and classification stipulated in the *Environmental Assessment of the World Bank Safeguard Policy* (OP4.01), the environment category has been classified as A based on the project type, location, sensitivity level, project scale and its characteristics, potential environmental impacts level. This *Regulation on Environmental Protection of Construction Works* has bee developed in order to standardize construction works and reduce as far as possible interference to sensitive and surrounding areas. This Regulation is applicable for construction of heat exchange station and heating pipelines.

I. Management system

1. Design of management system

In accordance with relevant regulations and actual engineering requirements and in order to better realize demonstration effect of the project, a special person shall be assigned in project management office (PMO) to be responsible for environmental management, and an environmental management system shall be established by relying mainly on external supervision of environmental protection authorities and assisted by internal supervision of project management agencies.

2. Responsibilities and personnel allocation of each agency related environmental management system

The responsibilities of each agency in this project and personnel allocation can be referred in **Table A-1.**

Table A-1 Responsibilities of each agency in environmental management system

Name of the agency	Type of the agency	Personnel allocation	Responsibilities of the agency
①Municipal environmental protection bureau	Supervisory agency	1	[1] Conduct whole-process environmental supervision and management for the project according to law, which includes: approval of environmental impact assessment report of the project, environmental supervision and management during the period of project construction and operation;
②Provincial PMO	Regulatory agency	1	[1] Compile and supervise the implementation of *Regulations on Practice of Environmental Protection;* [2] Supervise and coordinate the compliance of domestic and the World Bank requirements of environmental management; [3] Submit relevant reports annually to the World Bank; [4] Review project environmental management work; [5] Coordinate with other relevant agencies to resolve major environmental issues; [6] Assign and recruit environmental expert team to conduct review of the project;
③Municipal/county PMO	Regulatory agency	1	[1] Compile and supervise the implementation of rules and regulations about the project environmental management; [2] Cause the engineering design to meet the requirements in environmental impact assessment; [3] Incorporate environmental protection measures in this environmental management plan into construction contracts; [4] Recruit, supervise and coordinate with Engineering Project Supervisor (qualifications, responsibilities and management); [5] Organize and implement environmental management training program; [6] Conduct special study or relevant research work; [7] Record and sort out complaints during the construction and operation period, release the results of complaint handling and

			resolve complaints; [8] Review environmental supervision and monitoring report; [9] Submit report (statement) to provincial PMO semiannually; [10] Sign off field check list submitted by construction and supervision units; verify environmental sensitive problems and keep them in the archives; [11] Accept inspection of environmental work (including the World Bank review mission)
④The World Bank	Supervisory agency	1	[1] The World Bank will assign review mission annually to be responsible for special inspection of engineering construction; [2] Check the implementation of project loan agreement and the Regulations on Practice of Environmental Protection;
⑤ Grade A unit with construction project environmental impact assessment qualification certificate	EIA institution	3	[1] Conduct site visit and evaluate its environment. [2] Being responsible for compiling parts of the Regulations on Practice of Environmental Protection Work;
⑥Environmental expert team hired by provincial PMO	Consulting service institution	1	[1] Assist provincial PMO to check project environmental protection work; [2] Conduct site inspection to the construction site and the contractor; Draft and report to provincial PMO; Propose suggestions and opinions on the Regulations on Practice of Environmental Protection Work.
⑦Engineering project supervisor(being responsible for environment supervision work)	Consulting service institution	1	[1] The Engineering Project Supervisor is assigned otherwise by provincial or local PMO; [2] Supervise and check treatment of domestic and industrial sewage, preventive measures of water loss and soil erosion, control measures of waste gas, dust and noise, treatment of production, domestic waste and sediments, health & epidemic prevention in the construction area; [3] Complete regularly each check list about environmental management attached to the Regulations on Practice of Environmental Protection; [4] The corrective measures shall be implemented as to relevant environmental protection problems encountered during the construction works of the construction unit and their progress of implementation shall be tracked all the time, including issue rectification notice and check list, examination of document filing; [5] Ensure that the construction unit will compile and submit weekly implementation status of the project to local PMO;
⑧Construction unit	Enforcement body	2	[1] Develop environmental protection measures during the construction period; [2] Accept supervision and inspection from engineering project supervisor, the World Bank and environmental protection agencies at all levels in terms of environmental protection; [3] Establish a feedback mechanism and complete correction within 3 working days since the notice of correction is received (corrections must be completed within 10 working days if coordination of regulatory agency is required); [4] Complete with the project supervisor construction site checklist before the construction and report it to regional PMO; [5] The construction unit shall report implementation status of the project to the project supervisor on a weekly basis.

3. Environmental management tasks at each project stage

The primary objective of the Environmental Codes of Practice is to ensure various environmental protection measures proposed to be implemented practically and effectively, including: ① Incorporate environmental protection measures in Regulations on the Environmental Codes of Practice into project design and construction contract; ② to check the implementation of environmental protection measures based on environmental supervision and construction unit during the project construction; ③ A mechanism for check, report and filing of Environmental

Codes of Practice shall be established. The effectiveness of the work is reflected through examination of daily work.

At different stages of the project implementation, different information is specified in the Environmental Codes of Practice, which is shown as **Figure A-1**:

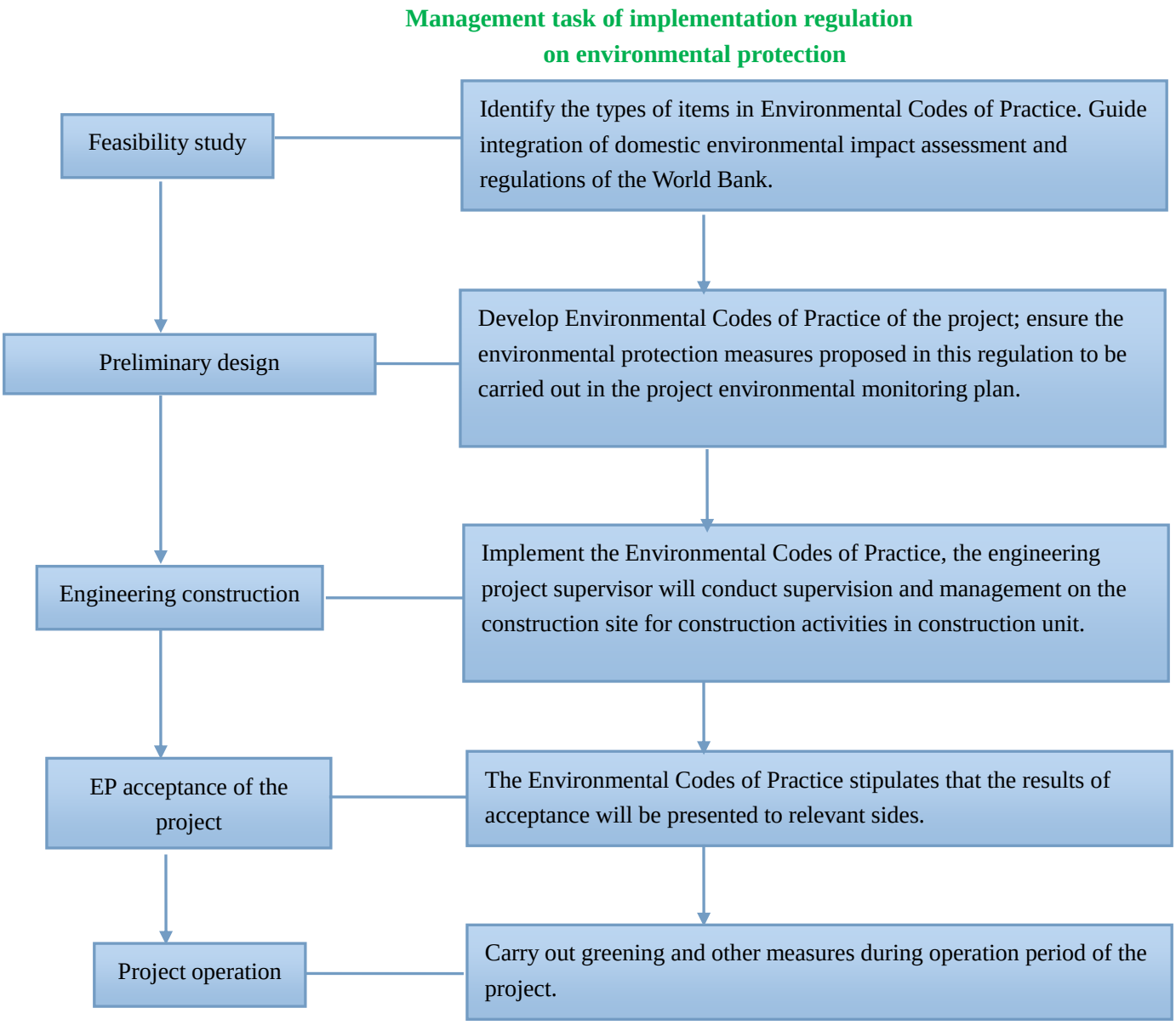

Figure A-1 Content of Environmental Codes of Practice at different stages during the project implementation

4. Working procedure of the agency performing the Environmental Codes of Practice during the construction period

Details can be referred in **Figure A-2**;

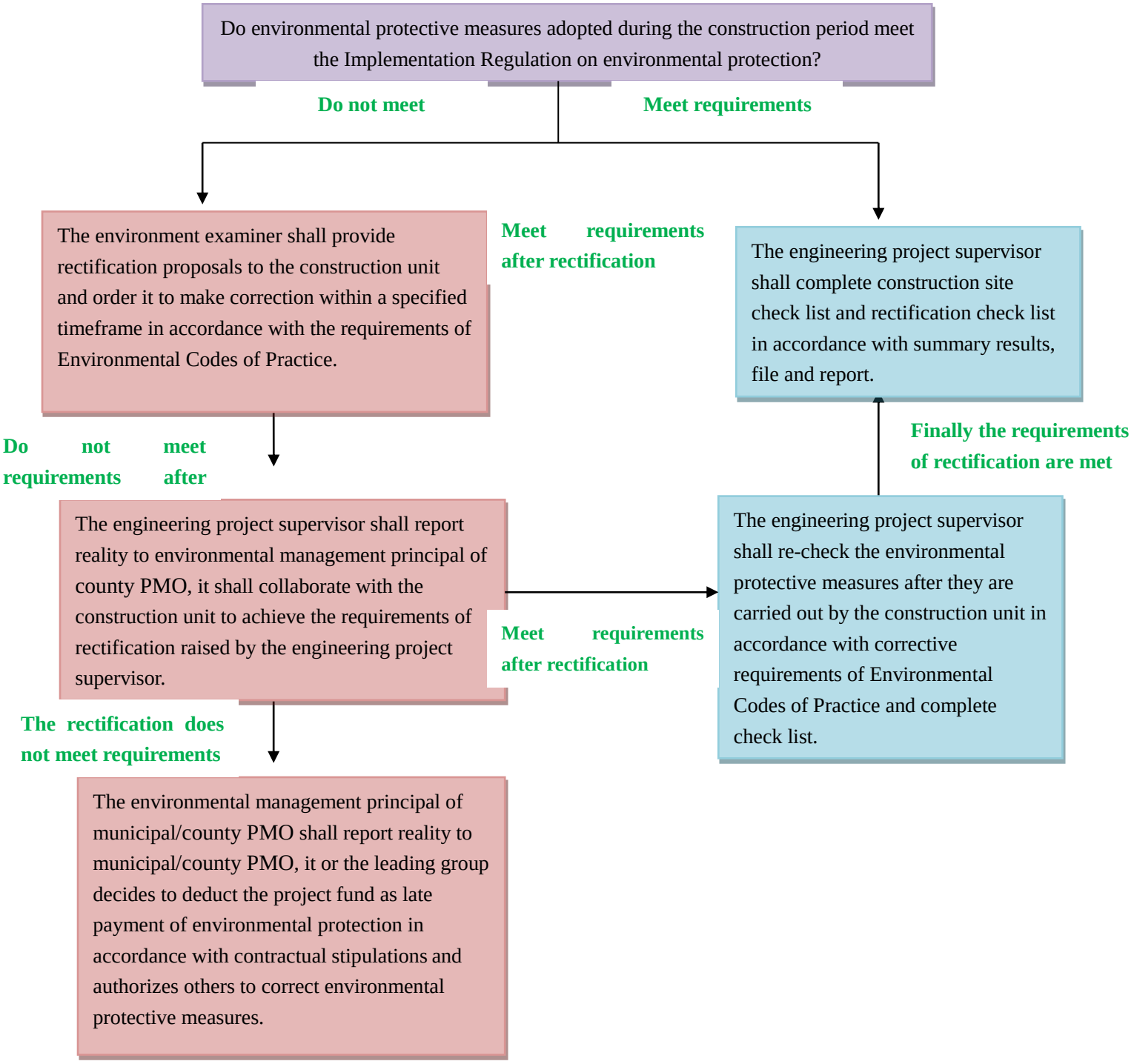

Figure A-2: Working procedure of the agency performing the Environmental Codes of Practice

4. Document management for Environmental Codes of Practice

During the implementation of Environmental Codes of Practice, the World Bank, the provincial project leading group and PMO, environmental impact assessment institute, engineering project supervisor and construction unit shall all be responsible for managing relevant documents, more details can be referred in the following **Table A-2**:

Table A-2: Requirements of document management at each agency

Name of the agency	Document management
①Construction unit	1. Record on a weekly basis the implementation of construction, file and report it to engineering project supervisor; 2. Complete the construction site check list with engineering project supervisor before the construction, file and report it to regional PMO; 3. In case of emergency, record specific implementation details, file and report them to the engineering project supervisor; 4. Upon receipt of the rectification notice, complete rectification within 3 working days (rectification shall be completed within 10 working days if coordination from regulatory agency is needed) and filing;
②Engineering project supervisor	1.Record on a weekly basis reports from the construction unit, file and report them to regional PMO; 2. Complete the construction site check list with the construction unit before the construction, file and report it to local PMO; 3. In case of emergency, record specific implementation details taken by the construction unit, file and report them to regional PMO; 4. The corrective measures shall be put forward as to relevant environmental protection problems encountered during the construction works of the construction unit and their progress of implementation shall be tracked all the time, including issuance of rectification notice and check list, examination of document filing;
③Grade A unit with construction project environmental impact assessment qualification certificate	1.Compile Environmental Codes of Practice and file respectively its first draft, draft for examination and draft for approval;
④Municipal/county PMO	1. Develop and implement rules and regulations on sub-project environmental management and file them; 2. Develop and apply for approval of domestic EIA documents, file them; 3. Develop and implement environmental management training plans, file them; 4. Organize special study or relevant research work, manage seminar and survey work documents and file them; 5. Record, sort out and file complaints during engineering construction and operation; 6. Record on a quarterly basis reports from engineering project supervisor, file and submit reports (statement) to provincial PMO; 7. Sign off construction site check list reported by the construction unit and engineering project supervisor; verify environment sensitive problems and keep them in the archives; 8.Manage and file reported rectification notices;
⑤Provincial project leading group and PMO	1. Develop, supervise and implement Environmental Codes of Practice, file it; 2. Record semiannually reports from each local project leading group and PMO and submit relevant reports to the World Bank, file them; 3.Coordinate with other relevant agencies to resolve major environmental problems, record detailed measures being adopted and file them;
⑥The World Bank	1.Record semiannually reports from provincial project leading group and PMO and file them;

II. General requirements of Environmental Codes of Practice

During the project construction, the contractor will play a key role in terms of environmental management, pollution control and implementation of preventive measures. In order to carry out Environmental Codes of Practice, this section lists some general requirements that are generally applied to each main agency during the construction. Thus, the construction unit can, under the coordination and internal/external supervision, management of provincial, municipal and county PMO and engineering project supervisor, carry out each environmental measure as stipulated in Environmental Codes of Practice.

1. Construction design drawings and implementation of environmental measures incorporate into bidding documents

Once the project is implemented, procurement will be carried out in accordance with procurement guidelines of the World Bank. The local PMO shall, under the coordination, guidance and supervision of provincial PMO, request tender compiling unit to compile this Environmental Codes of Practice and mitigation measures as to potential adverse environmental impacts in EIA of each sub-project into technical specification of the bidding documents and design drawings. The bidder is requested to incorporate all contents and requirements of this Environmental Codes of Practice into bidding documents and construction contract.

[1] The contractor is required to establish a supervision responsibility system for implementing environmental protection measures during the construction period, it shall be responsible for implementation of environmental protection measures throughout the construction period and ensure construction activities and its sub-contractors (if any) to meet each requirement of this Environmental Codes of Practice and necessary environmental protection measures have already been adopted during the construction process.

[2] The contractor shall communicate and negotiate with people in the area in which the project is located during the construction period, the bulletin board shall be established in each construction site to illustrate the concrete construction activities and working schedule. Meanwhile, the contact people and contact information of the construction unit shall be provided for the convenience of the people in complaining and suggesting.

[3] The contractor must comply with local rules related to safe and civilized construction;

[4] The construction unit and construction supervisor is required to receive training in terms of environmental protection and management. The provincial PMO authorizes external expert to train contractors and engineering project supervisor to identify various requirements of environmental protection related to this project.

[5] In case of any severe risk and accident caused by incompliance of environmental protection measures in Environmental Codes of Practice, the engineering project supervisor or the contractor must notify municipal/county PMO within 24 hours. The municipal/county PMO and environmental protection agencies at all levels shall order immediately the construction unit to adopt remedial measures, the contractor must guarantee that these remedial measures be implemented as effectively as possible to prevent recurrence of

similar risks. Meanwhile, the contractor must keep recording the implementation status of these measures and report on a regular basis to engineering project supervisor and the engineering project supervisor shall report it to municipal/county PMO and keep it in the archives.

[6] The contractor shall set aside part of the project cost as deposit for environmental management in accordance with annual budget, which shall account for about 3% of expenditure budget. If the construction unit takes inappropriate measures in environmental protection, the provincial PMO can impose a fine on the construction unit in accordance with the contract and deduct project fund for environmental protection, authorize others to adopt environmental protection measures.

2. Preparations before the construction

After the bid is awarded and before commencement of works, the municipal/county PMO shall provide results formed in environmental impact assessment of each sub-project, including EIA report and copy of EIA approval documents issued by local environmental protection agency, to the contractor under the coordination, guidance and supervision of provincial PMO. The contractor is required to conduct environmental survey on the construction site in order to verify and identify descriptions about surrounding area of the construction site in EIA assessment of sub-project and environmentally constraining factors in the project site.

The contents can be referred in Annex I of Environmental Codes of Practice, additionally appropriate environmental protection countermeasures shall be adopted for environment sensitive problems newly detected in environmental survey before commencement of works. Commencement of works is not permitted until approval of engineering supervisor and the construction activities at each stage shall be ensured to meet the requirements of Environmental Codes of Practice.

The environment sensitive problems survey before the commencement of works include:

[1] Check if there is electricity, water and gas supply, cable and telecommunication pipe laying in the section of pipeline construction;

[2]Check if there is sensitive point like school, hospital and residential area in the section of pipeline construction and at the construction site of heat exchange station;

[3] Check shade trees in the section of pipeline construction and if ancient and famous trees are needed to be transplanted;

[4] Whether or not the commencement of pipeline construction goes through relevant procedures at Planning Bureau and Bureau of Urban Utilities and Landscaping.

3. Approval of the authority and public consultations

The construction unit must collaborate closely with local governmental agencies and other agencies throughout the construction duration in order to ensure the government regulations are met fully. The construction unit shall notify in advance local residents and public in the neighborhood of the construction site of the site, including estimated duration of the construction. The public shall be provided with sufficient information, especially construction

activities that may possibly lead to public security, affairs that may do harm to public interests, sensitive area and temporary stowage area for the construction.

The construction unit must disclose open and transparent public participation mechanism and hotline telephone to receive consultations and advices from the public. The hotline telephone deals with various incoming calls concerning construction interference on the environment and records all incoming calls so as to reflect hot issues given so much attention by the caller. Meanwhile, a quick response mechanism shall be established to answer frequent questions raised by the public.

III. Site control during construction

As the main content of the *Environmental Codes of Practice*, this chapter puts forward the environment protection measurements and basic requirements of environmental management which instruct contractors to perform the engineering of heat exchange station and heating pipe network. It also summarizes requirements for construction site, which mainly include construction time, construction nameplate, construction hoarding, construction barricade, temporary access, construction encampments and accident risk prevention. Construction units must comply with the provisions of the local environmental protection agency and undergo regular inspections of environmental supervision.

1. Construction time

[1]. Construction time is from 6 am to 22 pm. Construction should be stopped during lunch breaking time, which is from 12 am to 14 pm. The working time for construction vehicles must comply with the requirements of the local government.

[2]. Construction at night should be limited. Construction units should announce to the residents if this cannot be avoided. Meanwhile, they also should go through relevant procedures and take measures to reduce the impacts to local residents.

2. Arrangement of construction nameplate

[1]. Construction units must indicate construction time, working schedule, service interruption, traffic detour routes, temporary bus lines and demolition on the construction nameplate.

[2]. Construction at night should be limited.

[3]. If necessary, construction units should control the constructing influence on the surrounding and announce to the committee in advance to make the public take the necessary measures.

[4]. Construction units must post notices to announce the public in the project sites, bus stations, affected residents and companies at least five days before service interruptions (including water, electric, gas and traffic lines)

3. Arrangement of construction hoarding

[1]. The hoardings should be set around boundaries of construction site to ensure enclosure in construction engineering whose period is more than 30 days. They shall be made of sheet

metal and hard materials. The height of the hoardings shall be equal to or larger than 2 meters in the general construction site and 2.5 m in the key construction site.

[2]. The hoardings shall be straight and upright, uniform and standardized, clean and good-looking and non-damaged. Their appearance shall along with the surrounding environment.

[3]. The hoardings occupying the road shall be set within the visible scope of 5 m away from the intersection of roads. Hoardings made of metal halftone which have the straight stiffness, are set so that the sight of drivers and pedestrians doesn't be sheltered, to ensure the traffic security. It is prohibited to pile up all sorts of things within the visible scope of 5 meters.

[4]. If the distance is equal to or less than 5 m between the hoardings and residence or 15 m between construction site and sensitive structures, such as residence, hospitals and schools, the noise abatement measures, which should conform with relevant specification and standard provisions, of heightening hoardings and setting noise barriers shall be taken. It should keep clean within 5 m outside of hoardings.

[5]. It is prohibited to pile up materials, such as tools, earth and rubble, within 1 m inside of hoarding.

[6]. It is prohibited to use hoarding as retaining walls or supports for other instruments and equipment.

[7]. Hoardings shall be set to ensure enclosure around boundaries of construction site in pipeline engineering in the key area.

4. Arrangement of construction barricade

[1]. Construction barricade shall be set around boundaries of construction site in pipeline engineering whose construction period is equal to or less than 30 days.

[2]. It is prohibited to use security isolation rope composed of red and white flags or other materials instead of construction barricade.

[3]. Construction barricades should linked continuously to be a closed enclosure. Barricades shall be tight and solid, uniform and standardized, clean and non-damaged.

[4]. Folding construction barricades shall be set around the boundaries of the work zone in which operations should be performed after opening or lifting blind manhole covers on the urban road where traffic keeps unobstructed.

[5]. The long sides of the base channels shall face the construction site in construction barricade setting. The width of construction access road, which needs to be set between construction barricades and construction site shall be equal to or larger than 0.6 m.

[6]. Construction unit's name shall be printed horizontally on the construction barricades. It is prohibited to set the construction barricades which are irrelevant to the organization's name in construction site.

[7]. Construction barricades shall be closed completely around the boundaries of work zone in which coating refresh or cleaning construction work would be performed on the surface of buildings. All sorts of mechanical equipment, tools and materials shall put within the scope of enclosure.

[8]. If temporary access road isn't adopted in road construction or the engineering hasn't been finished, it is prohibited to remove construction barricades.

[9]. In the key site, the construction method of "one excavation section, one laying section, one restoration section" shall be adopted in pipeline engineering. It is strictly prohibited to conduct all excavation work at the same time.

5. Arrangement of temporary access

[1]. To construct on the urban roads needs to comply with the relevant provisions of Public Security Traffic Administrative Department and Road Administration Management, go through relevant approval procedures, and set the temporary access.

[2]. Construction units shall strictly comply with licensing provisions. It is strictly prohibited to occupy roads arbitrarily or construct beyond the prescribed time limit.

[3]. If organizations need to construct on the occupied urban roads and it influences the traffic of vehicles and pedestrians, they shall set the temporary access in accordance with provisions.

[4]. Organizations who occupy urban roads to construct shall set firm, even and continuous sidewalks enclosed securely near the edge to ensure the safe traffic of pedestrians on one side of access doors in the near markets, companies, office buildings and residences.

[5]. When organizations dig trenches or pipeline grooves on urban roads, if they can't finish it on that day and the road is still taken as a passing way, they shall take the steel covering and flatting method to construct continuously the next day.

[6]. Metal section shall be the supporting and strengthening material under the covering steel, when the width of trenches is equal to or larger than 0.8 m.

[7]. The supporting and strengthening measure shall go through the safety confirmation and be reported to construction unit for approval. The thickness of the steel plate covering the road shall be equal to or larger than 0.03 m. Sides of steel plate and metal slope frame shall be polished to ensure no sharp edges or burrs. Consequently, pedestrians and vehicles can pass safely.

6. Arrangement of construction encampments

[1]. Construction units should make use of surrounding existing facilities as much as possible and rent rooms to reduce the influence on the surrounding environment.

[2]. Organizations should arrange, store and deal with all the solid wastes produced in the construction site.

[3]. Natural wood can't be used as fuels when they process or prepare materials needed in

the engineering, cook or heat their rooms.

7. Accident risk prevention

[1]. Construction units should formulate the accident prevention measures in advance and name person in charge of emergency. Once an accident occurs, he can ask the relevant department for help.

IV. Air pollution control

1. A variety of construction activities may cause emissions of air pollutants during the construction and operation period.

2. The main air pollutants in this project are:

[1]. Dust emissions caused by stockpiling area, earth excavation for channel and transport activity.

[2]. Dust emissions caused in small boiler demolition process.

[3]. Dust emissions caused by material transportation on construction roads.

[4]. Waste gas produced in the process of road paving.

[5]. Automobile exhaust pollution produced by construction machinery and vehicles.

3. Environmental management should be strengthened to reduce the influence of construction on environment. The following measures are put forward.

[1]. The water spraying operations must be performed to reduce dust pollution in the construction site on dry days. Excavation, earth backfilling and other activities that may cause dust should be stopped if the wind level is equivalent and/or large than IV, and site should be covered and increasing water spraying frequency.

[2]. The efficient measures of dust controlling should be taken when materials go in or out of the cement silo and the mortar powder silo used in the construction site. It is forbidden to conduct cement mixing on site but pre-mixing should be adopted.

[3]. The measures of greening simply by sowing grass seeds, covering dust-proof gauze and consolidating in new type should be taken to deal with the muck retained in the site and the bare earth in the field.

[4]. Earth produced in the excavation of pipelines during the day should be cleaned after work.

[5]. The height of muck retained in the site is prohibited to exceed the height of the hoarding or barricades.

[6]. Vehicles which transport powders must be covered and cleaned before leaving the site.

[7]. Dusty materials must be wetted when being transported.

[8]. After stockpile is removed, any dusty materials must be wetted by water and cleaned from the road.

[9]. Hard-road or wetting measures must be taken on the dusty roads.

[10]. Organizations must ensure that the amount of water used to control dust emissions can't influence the surface flow or water use of the local community.

[11]. Covering or watering measures should be taken to reduce the dust in the piling site of dusty materials.

[12]. Bags of cement should be open in a sheltered site.

[13]. Construction must be performed in the regulated time to reduce the air pollution. Construction time is from 6 am to 22 pm. And construction should be stopped on lunch breaking time, which is from12 am to 14 pm.

[14]. The transported goods should be covered properly and tied tightly in the transportation. It needs to ensure that vehicles don't overload the earth, stone, waste soil and slag to prevent them from falling.

[15]. The choice of location of stockpile should consider the influence of wind direction to avoid dealing with dusty materials on the upwind location of sensitive receivers.

[16]. It should take measures of wind recovery and dust suppression to pile up the construction materials.

[17]. Organizations should ensure the proper route to transport the solid waste. They need choose the road as even as possible to avoid bumping and reduce the dust emissions.

[18]. The water spraying operations must be performed in the construction site in a demolition project.

[19]. The temporary enclosure must be set in the construction site.

[20]. Speed is limited on the roads along which vehicles enter into the construction site and construction roads. There should be a speed limit sign, with which construction vehicles must comply.

[21] Transport vehicles and other construction machinery should install exhaust gas purification equipment and exhaust emissions standards should meet. Fixed equipment exhaust chimney should be placed in a location away from residential areas, and maximize the use of highly conducive to the spread enough

V. Water pollution control

1. Waste water produced by construction activities can have a bad influence on the water quality.

2. The following activities shall influence on water quality when project is during the construction and operation period.

[1]. Waste water produced by construction equipment.

[2]. Uncontrolled surface runoff.

[3]. Soil erosion caused by the non-covering protection to the stockpile and the excavation

points in a bad weather conditions.

3. Environmental management should be strengthened to reduce the influence of construction on environment. The following measures are put forward.

[1]. The site in which the hoarding is set should be inside of access doors. One horizontal general drain tank should be set along the line out of doors. And it should be connected with the drainage system in the site.

[2]. Vehicles washing drain tank should be designed in accordance with the specific size of vehicles. Its surface should be plastered and evened by pre-mixed mortar. And its groove should be covered with metal halftone which has high load-carrying capacity.

[3]. Sedimentation tank with enough large capacity should be set in the construction site. And it needs to be cleaned regularly and dealt with by the solid waste disposal method.

[4]. Domestic sewage must go through tertiary treatment of sewage in the septic tank. After that, it can be discharged into the municipal pipe network and dealt with properly.

[5]. Construction must be performed in the regulated time to reduce the production of waste water.

[6]. Water discharged into the surface and waste water in the sewer line must conform with the laws and regulations of the water environment protection in China.

[7]. Construction units should send workers to clean deposits in the channel, winze and sedimentation tank. It is cleaned once per 10 days in the key area and once per month in the general area.

[8]. Organizations should maintain the waste water treatment (such as the sedimentation tank) in the construction site regularly.

[9]. It is prohibited to discharge the mud or slime water into the the city pipe network directly.

[10]. Vehicles and equipment should be cleaned before removing from the construction site.

[11]. The public roads and places, entrances and temporary hoardings revolving in the construction site should keep clean.

[12]. There must be enough area to store the wastewater treatment system.

[13]. Make clear the location of wastewater discharge point.

VI. Noise pollution control

1. A large number of equipment which produces noise shall be used in this project, such as back-acting shovels, bulldozers, cranes, trucks, generators, ground works, transportation and vehicular traffic.

2. Noise will be produced in the following activities:

[1]. The operation of construction equipment (such as mechanical equipment, bulldozers

and excavators).

[2]. Transporting vehicles deliver materials inside and outside of construction site.

3. Environmental management should be strengthened to reduce the influence of construction on environment. The following measures are put forward.

[1]. Organizations must comply with the relevant noise legislation during construction.

[2]. If not being examined and approved and put on records, organizations are prohibited to construct at night in the construction site.

[3]. Except for the special site in which pipeline construction is performed at night to avoid the influence on traffic during the day, it is strictly prohibited to construct at night.

[4]. If organizations construct at night in the special construction site, they should be submitted to the construction administrative department for filing. And they can't start and operate the mechanical equipment producing noise without authorization.

[5]. Except emergency and rush repair, construction units should arrange construction procedures properly and actively avoid implementing the pile foundation and foundation pit excavation in the construction site which is equal to or less than 100 meters from the residence and examination rooms during the college entrance examination and high-school entrance examination. And they shall comply with the provisions of terminating construction.

[6]. When the pipeline construction is implemented, the cladding method should be applied to the damaged roads and hard surfacing.

[7]. Various pavement damage device should be operated in the mobile operation site. Pavement damage machinery should take the noise abatement measures to control noise effectively.

[8]. Low noise equipment or noise-reducing devices (noise boards and barriers) should be operated in the construction.

[9]. Contractors need to maintain construction instruments regularly to control them under optimal operating condition and at the minimum noise level as far as possible.

[10]. The honking-prohibited signs should be set in the sensitive structures, such as the schools, hospitals and office buildings; the route of vehicles for transporting materials, earthwork should avoid concentrated area residents, try to avoid sensitive periods during transportation (22: 00 pm- 6:00 am the next day).

[11] Some noisy construction equipment is relatively centrally located, fixed noise sources should be located as far away from sensitive targets as possible, minimizing noise by adopt them inside during construction phase.

[12] Do not install concrete mixer on site, ready-mixed concrete should be purchased.

[13] Before commencement of construction, residential buildings surrounding the site are special sensitive targets, construction units should communicate with the relevant

committees, and inform the construction schedule by neighborhood committee. To the residents' access point, posting publicity Construction Notes.

[14] Before construction commencement nearby schools, construction units should be in consultation with the school, and reasonable construction work time schedule should be proposed avoid the disturbance of the class time, try to arrange the high noise level construction activities on weekends or after school, and also speed up the construction progress to shorten the construction period. Construction is prohibited during the examination period.

VII. Solid waste management

1. Solid waste generally includes any garbage. For instance, the household garbage, inert materials of construction and demolition waste produced in the construction site.

2. Solid waste is produced by the following activities:

[1]. Too much excavated earth need to be dealt with in the earthwork excavation.

[2]. The disposal of wood, steel, site hoardings, package materials, fuel tank, lubricant and paint used in the construction.

[3]. The household solid garbage produced by workers, kitchens and toilets.

[4]. The waste produced by on-site wastewater treatment facilities (sedimentation tank).

[5]. The solid waste produced by the small boiler demolition.

3. Environmental management should be strengthened to reduce the influence of construction on environment. The following measures are put forward.

[1]. It must choose the organization disposing the solid waste which has the business certificate.

[2]. The construction site must be clean (it can’t be disorganized).

[3]. Construction waste, reclaimable waste and general waste should be cleaned regularly and stored by category in the construction site.

[4]. If there is the oil spill, organizations must clean the polluted earth immediately during the construction.

[5]. Stoppers in the near drain or sewer should be cleaned regularly.

[6]. Mud sandy depositing in the flushing facilities should be cleaned regularly.

[7]. After finishing the project, organizations should clean all the rest waste in the construction site and dispose them properly.

[8]. Garbage of all the instruments should be collected and removed regularly. The household and construction garbage should be delivered to the designated garbage disposal place by the container with a cover or a truck. Construction waste removal vehicles should be routed, time and place of delivery, transport vehicles should be loaded in moderation,

and take sealed bandage, covering and other measures to prevent scattering, dusting and dripping;

[9]. There should be enough large area to store all the sorts of solid waste temporarily in the construction site.

[10]. If rock wool waste exists in the small boiler, it should be delivered to the designated place air tightly to be buried deeply in time.

[11]. The detailed lists of solid waste disposal should be prepared.

[12]. Transaction receipts of solid waste transportation should be kept.

VIII. Ecological environment protection

1. The construction of the project can have an impact upon the ecological environment. Thus the corresponding mitigation measures should be included in the environmental management plan of the project.

2. The ecological effects during the construction are associated with activities below:

[1]. The space clean-up and vegetation clearance will cause a loss to street plants and roadside vegetation.

[2]. The excavation will pose a threat to the soil.

[3]. The construction will pose a threat to the vegetation outside the construction site.

3. The environmental management should be strengthened to reduce the impact of construction on the environment and there are the following measures.

[1]. The quality and quantity of the construction guaranteed, the contractors should shorten the time of temporary land occupation as possible, control the construction time of the ground works, maintain the stability of excavation and filling and reduce the impact upon the area outside the construction land. Especially in the rainy season, they had better optimize construction land planning reasonably, try to reduce the range of construction activities. Also the construction materials should be transported when needed and the greening should be restored immediately when the construction is completed.

[2]. Try to protect the ancient and rare trees that aren't needed to be developed within the construction land.

[3]. The street trees should be re-planted the instant the construction of the temporary land occupation is completed and appropriate local species should be selected to plant and help to restore the greening.

[4]. No feeding of pets or animals of any type during the construction.

[5]. The exposed soil should be restored quickly and vegetation needs re-planting. The completed area should be restored back to the same to keep the stability of a slope and the completion of soil.

[6]. It is necessary to provide an educational training about ecological environment

protection to contractors and workers before the construction.

[7]. It is necessary to insure there is no natural reserve, ecological garden or cultural reserve near the construction site.

4. Prohibition

[1]. No any cutting of trees beyond the authorized construction site.

[2]. No interference to animals and plants beyond the construction site.

IX. Cultural relics

1. The construction of the project can have an effect on cultural ruins and cultural relics. And it is guaranteed in the environmental impact assessment report that the cultural ruins shall be emphasized in the environmental management plan.

2. Cultural ruins and cultural relics are associated with the following factors during the construction:

[1]. The cultural ruins may disappear or can be destroyed due to the project.

[2]. There exists the potential damage to the structure and stability of the cultural ruins during the construction and operation.

3. According to the related survey, there are no cultural relics within the construction site. If cultural relics are found or there are probably cultural monuments during the construction and excavation, the following measures shall be taken:

[1]. The construction shall be stopped wherever cultural relics are found and the scene protection should be strengthened.

[2]. Contractors shall report to the police immediately and the competent department of culture will give an identification.

[3]. The non-operating loss of contractors shall be compensated by the relevant state departments.

[4]. The protection domain shall be delimited the instant cultural relics are authenticated by experts.

[5]. Owing to the urgent construction or natural damage, the cultural relics should be rescued and excavated.

[6]. The rescue excavation of cultural relics shall be in the charge of professionals by professional facilities and contractors cannot excavate without authorization.

[7]. Whether the construction site should be changed will be discussed once it’s regarded as a finding of valuable cultural relics.

4. Prohibition

No interference to any architecture-relevant articles or ones with historical value.

5. Flow chart of emergency

The flow chart of emergency once cultural relics are found is illustrated by the Figure A-3.

X. Health and safety

1. Contractors are responsible to protect workers and properties from the emergency and conform to the national or local safety standards.

2. Some crucial risks relevant to the construction:

[1]. The risks of falling objects and unstable work-platform.

[2]. The risks of fires.

[3]. The risks of working on the unstable geology.

[4]. The traffic safety within the construction site.

[5]. Personal hygiene and the spread of epidemic diseases.

3. To reduce the effect upon the environment, the environmental management should be strengthened and there are following measures.

[1]. Keep traffic signs, road markings, the supply of guardrail products (including the oil paint, easels, marking materials and so on) and the safety of pedestrians during the construction.

[2]. Give a safety-training to workers before the construction.

[3]. Provide workers with personal protective equipment and clothing and force them to use.

[4]. All work should be stopped at the time of rainstorms and any emergencies.

[5]. Increase the prevention and treatment of AIDS and give an education to workers. Such as the implement of information communication strategy, the strengthening of consulting work face to face, the settling of systematic problems associated with personal behaviors and encouragement of personally-taken protection measures.

4. Prohibition

[1]. No using of open fire.

[2]. No using of unapproved poisonous materials, such as lead paint and asbestos.

[3]. Workers are prohibited from using alcohols.

Table A-3 Site Checklist Prior to the Construction

No.: Contract number and name:

The project name: Copy unit:

Current construction stage: Inspected by: Date:

Items	Implementation	Notes/

	Implemented	Unimplemented	Not applicable	suggestions
1. Natural habitats				
1.1 Whether the construction site is located in or close to national parks (existing or planning), natural reserves or areas of high-cultural value or not?				
1.2 Whether there exists the fragile or endangered species in the construction site or not (terrestrial or aquatic species)?				
1.3 Whether there exists a natural habitat in the construction site or not?				
1.4 Whether it is fragile, rare and range-limited or not if there exists a natural habitat?				
1.5 Whether there exists a wetland and an area with saturated soil or not (permanent or temporary)?				
1.6 Whether there exist archaeological, historical or other cultural heritages that have been known or not (graves, cemeteries and so on)?				
1.7 Others (please specify)				
2. Materials and cultural resources				
2.1 Whether the project will lead to permanent or temporary migration or the project will affect materials and cultural resources known or not?				
2.2 Whether the materials and cultural resources of the project make a difference to local residents or not (such as cemeteries)				
2.3Whether there exist archaeological, historical or other cultural heritages that have been known or not (graves, cemeteries and so on)?				
2.4 Others (please specify)				
3. Preparations before the construction.				
3.1 Whether the construction team has been hired or not?				
3.2 Whether the location of the storage area has been ensured or not?				
3.3 Whether seeds, native vegetation and topsoil have been collected and stored is essential to help to restore the site.				
3.4 Whether the construction road is cleared or not, including the clearance of roots and organic waste?				
3.5 Whether there exist buried pipelines of facilities like electric power, water delivery, fuel gas, optical cable and telecommunications on the pipeline construction sections or not?				

Items	Implementation			Notes/ suggestions
	Implemented	Unimplemented	Not applicable	
3.6 Whether there exist sensitive spots like schools, hospitals and mass houses on the pipeline construction sections or not?				
3.7 Whether there exist ancient and rare trees that need to be transplanted among the roadside plants on the pipeline construction section or not?				
3.8 Whether the operation of pipelines has procedures of relevant departments like planning department, municipal department of parks and woods or not and whether the construction is legitimate or not?				
3.9 Others (please specify)				
4. Surrounding environment and people				
4.1 Whether the project has infringed upon the interests of the surrounding people or not?				
4.2 Whether the construction of piping network has an impact upon the surrounding people or not?				
4.3 Whether the project is involved in the issue of the temporary land occupation or not				
4.4 Whether the project is involved in compensation issues or not?				
4.5 Whether the project has an impact upon the production facilities or not?				
4.6 Whether the project has an impact upon the service or resources channel or not?				
4.7 Whether the project has impeded the normal life or not?				
4.8 Others (please specify)				

Table A-4 Construction Management Checklist

No.: Contract number and name:

The project name: Copy unit:

Current construction stage: Inspected by: Date:

Item	Implementation			Notes/suggestions
	Implemented	Unimplemented	Unsuitable	
1. Air pollution control				
1.1 Whether watering is used to reduce the raised dust on the construction site or not?				
1.2 Whether vehicles loaded with powdery are covered or cleaned before leaving or not?				
1.3 Whether the road surface of dusty roads is hardened or watered to keep wet or not?				
1.4 Whether it's ensured that the amount of the water used to control raised dusts will make no difference to the surface flow or the water-use of local community or not				
1.5 Whether the lots stacked with powdery materials are covered or watered to reduce dusts or not and whether cement bags can be opened at somewhere shady or not?				
1.6 Whether there are facilities for regular checking, maintaining and cleaning of tires or not?				
1.7 Whether the transported cargo is properly covered or firmly tied or not?				
1.8 Whether the wind direction is taken into consideration at the time of choosing the location of material piles or not?				
1.9 Whether the wind dust-controlling measures are taken to protect the material piles or not?				
1.10 Whether a reasonable course of solid waste transportation is ensured to reduce the emission of dusts or not?				
1.11 Whether it is watered in the demolition engineering or not?				
1.12 Whether the places where raised dusts are produced (like the stirring of mud) are closed or not?				
1.13 Whether a temporary construction fence is built or not?				
1.14 Whether the speed is required or there are speed limit signs on the construction road or not?				
1.15 Whether the construction vehicles keep to the speed limit or not?				
1.16 Whether the construction time conforms to the stipulation to reduce the emission of dusts or not?				
1.17 Whether the powdery materials are moistened before being transported or not?				
1.18 Whether the remaining dusty materials are moistened and discharged from the road surface after the material piles are taken away or not?				
1.19 Whether dust control measures are taken when the presently-used cement silos and mortar powder silos are taken in and taken out or not?				

Item	Implementation			Notes/suggestions
	Implemented	Unimplemented	Unsuitable	
1.20 Whether the unearthing of the excavation of pipelines is dealt day by day or not?				
1.21 Others (please specify)				
2. Water pollution control				
2.1 Whether a horizontal and long sink is set up inside the in-out door and along the door on a construction site with fence or not?				
2.2 Whether the sink is connected with the drainage system of the construction site or not?				
2.3 Whether the washing sink of vehicles is designed according to the specific size of vehicles or not?				
2.4 Whether a big enough settling pond is set up inside the construction site of an area without the sewer or not?				
2.5 Whether the settling pond is regularly de-silted or not and whether it is dealt according to the handling of solid waste or not?				
2.6 Whether the sewage is exhausted into the sewer or not?				
2.7 Whether the sludge of the sink is disposed or not?				
2.8 Whether the construction time conforms to the stipulation to reduce the production of waste water or not?				
2.9 Whether the water discharged into the earth surface and the sewer conforms to Chinese laws and regulations about water environmental protection or not?				
2.10 Whether the wastewater treatment system of the construction site (like the settling pond) is normally used and maintained or not?				
2.11 Whether vehicles and equipment are cleaned before leaving the construction site or not?				
2.12 The maintenance situation of washing facilities. Whether the sediments are prevented from spilling over or being submerged or not?				
2.13 Whether the public roads and places surrounding the construction site, entrance and temporary fence are kept clean or stuck with muddy water or not?				
2.14 Whether there is an enough place to accommodate the wastewater treatment system or not?				
2.15 Whether the location of wastewater discharge point is clear or not?				
2.16 Others (please specify please)				
3. Noise pollution control				
3.1. Whether the construction conforms to the relevant noise regulations or not?				
3.2. Whether an effective noise permit is held during				

Item	Implementation			Notes/suggestions
	Implemented	Unimplemented	Unsuitable	
the period of noise-limitation or not?				
3.3 Whether mulch method is used in breaking and excavating the hard-surfaced road at the time of pipelines construction or not?				
3.4 Whether it is recorded at the same time by the construction administrative department when the working is on the special construction site at night or not?				
3.5 During college entrance examination and high-school entrance examination and in addition to urgent repairs, whether working procedures are reasonably arranged by the construction units to avoid the implementation of the pile foundation and excavation of foundation pit on the construction site which is equal to or less than 100 meters residence and examination rooms or not and whether the construction conforms to requirements of shut-downs or not?				
3.6 Whether all pavement crack devices are operated in the mobile operation rooms or not and whether the de-noise measures are taken in the operation of pavement crack machines to effectively control the noises or not?				
3.7 Whether low-noise devices are adopted during the construction or not?				
3.8 Whether the construction time conforms to the stipulation to reduce the noise pollution or not?				
3.9 Whether low-noise devices are adopted and de-noise measures are taken during the construction or not?				
3.10 Whether contractors have maintained the construction devices to keep them in a good condition and with the lowest noises or not?				
3.11 Whether there are honking-prohibited signs of vehicles on the sensitive spots like schools, hospitals, nursing homes and office buildings or not?				
3.12 Others (please specify)				
4. Solid waste management				
4.1. Whether the solid waste is disposed by work units with business licenses or not?				
4.2 Whether the construction site is clean and tidy or not? (whether the construction site is disorganized or not)				
4.3 Whether the construction waste, recycling waste and general waste are regularly disposed and classified and stored or not?				
4.4 Whether oil pollution is spilt during the construction and the polluted soil is cleared immediately or not?				
4.5 Whether the obstructions in the surrounding drain or sewer are disposed during the construction or not?				

Item	Implementation			Notes/suggestions
	Implemented	Unimplemented	Unsuitable	
4.6 Whether the precipitated clay sands on the washing facilities are disposed regularly or not?				
4.7 Whether the remaining waste on the construction site has been cleared and properly handled when the project is completed or not?				
4.8 Whether the waste of all facilities has been collected and disposed regularly or not? Whether the household garbage has been transported to the appointed waste-yard by containers with a cover or trucks or not?				
4.9 Whether the solid waste can be stored temporary at somewhere big enough on the construction site or not?				
4.10 Whether the transporting course of solid waste has been ensured or not?				
4.11 Whether the solid waste processing details list has been compiled or not?				
4.12 Whether the solid waste transport transaction documents have been kept or not?				
4.13 Others (please specify)				
5. Ecological environment management				
5.1 Whether measures are taken to restore the damaged street plants or not?				
5.2 Whether appropriate local species has been selected to plant and help to restore the greening or not?				
5.3 Whether there is any feeding of pets and animals on the construction site or not?				
5.4 Whether the ancient and rare trees that aren't needed to be developed are protected within the construction site or not?				
5.5 Whether the construction is carefully arranged to shorten the working time or not?				
5.6 Whether an educational training about ecological environment protection is provided to contractors and workers before construction or not?				
5.7 Others (please specify)				
6. Population Health and safety management				
6.1 Whether there are signs to keep the health and safety of workers on the construction site or not?				
6.2 Whether the construction units have provided protective equipment and have given a safety-training and education about AIDS to workers or not?				
6.3 Whether the campsite, the facilities and areas of the construction are equipped with fire-fighting equipment or not?				
6.4 Whether all machine operators and vehicle attendants possess the qualification certificate of operation or not?				

Item	Implementation			Notes/suggestions
	Implemented	Unimplemented	Unsuitable	
6.5 Whether there are enough fire-fighting equipment, fire-fighting water-pipes and fire hydrants on the construction campsite or not?				
6.6 Whether safe stadia is set within the construction site and campsite or not?				
6.7 Others (please specify)				
7. Cultural relics				
7.1 Whether the construction is stopped wherever the cultural relics are found and the scene protection is strengthened or not?				
7.2 Whether contractors report to the police immediately for the identification of competent department of culture or not?				
7.3 Whether the non-operating loss of contractors is compensated by the relevant state departments or not?				
7.4 Whether the protection domain is delimited the instant cultural relics are authenticated by experts or not?				
7.5 Whether the cultural relics are rescued and excavated because of the urgent construction or natural damage or not?				
7.6 Whether the rescue excavation of cultural relics is in the charge of professionals by professional devices or not?				
7.7 Whether the discussion is made that the construction site should be changed once it's regarded as a finding of valuable cultural relics or not?				
7.8 Others (please specify)				

Table A-5 Environmental Rectification Notice

No.: Contract No. and name:

Name of the subproject: Copy to:

Current construction stage: Date:

Problems existing in site inspection:
Analysis cause and improving measures:
Opinion from the rectification of environmental protection department (if necessary):
Environmental inspector: Date: Expiration date of rectification: Accepted by: Date:
Conclusion of review: Reviewed by: Date:

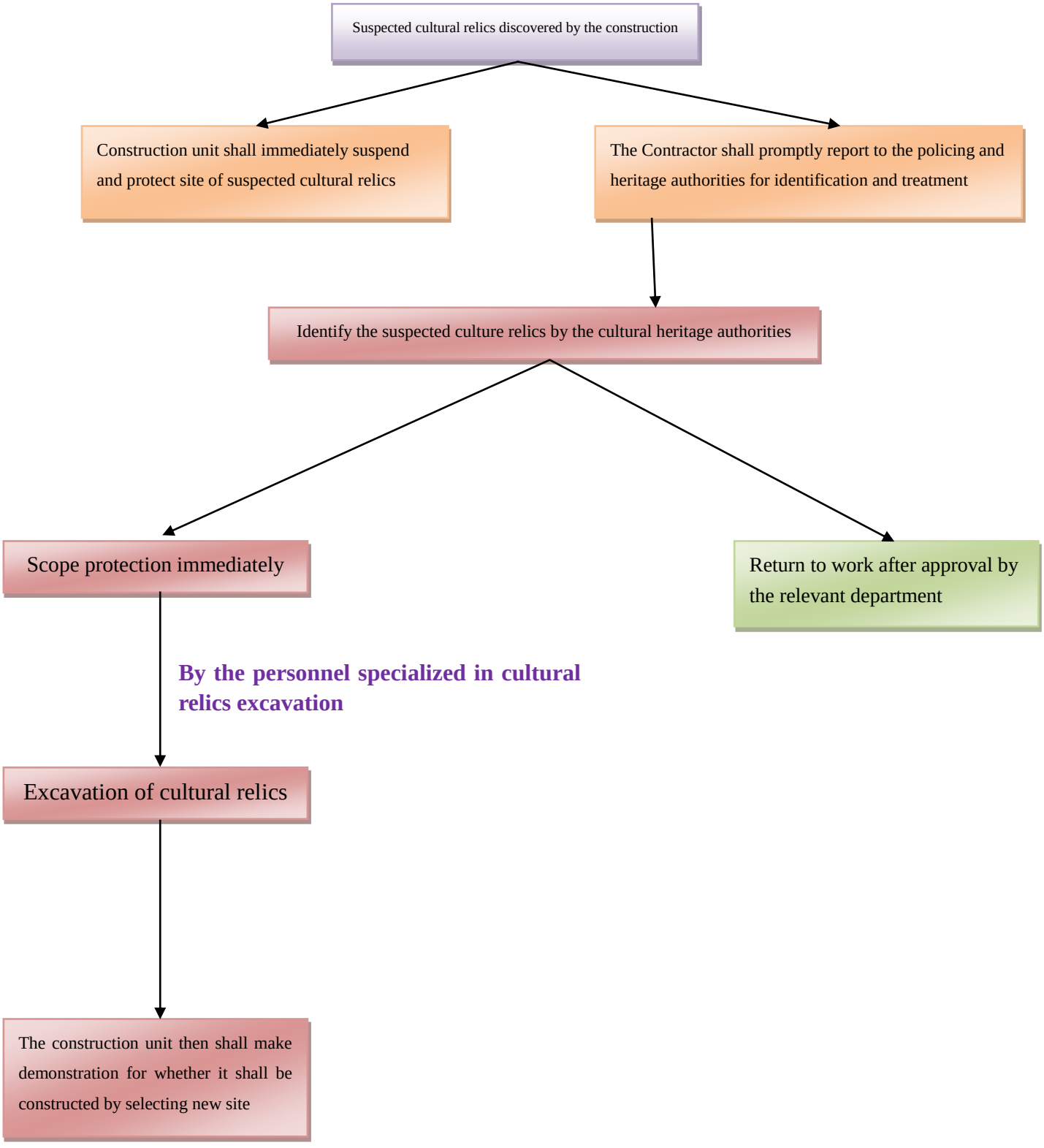

Figure A-3 Flow chart of emergency handling of cultural relics discovered

Appendix B

Environmental Management Plan for Small Boiler Dismantlement

Annex B Environmental Management Plan for Small Boiler Dismantlement

I. Overview

The subprojects in Chengde, Xingtai and Zhangjiakou involve the dismantlement of some existing small boilers during project implementation. In order to reduce the environmental and social impacts brought by the dismantlement work as much as possible. We hereby prepare a separate environmental management plan for small boilers dismantlement for decreasing its impacts on atmospheric environment and properly dealing with the solid waste especially hazardous waste from the dismantlement.

II. Content of Dismantlement

The scope of small boilers demolition in these three subprojects includes:

Table 1 The scope of small boilers demolition in each subproject

Subproject	Content
Chengde	To dismantle 4 independent small coal-fired boiler rooms in project area, with 6 small boilers involved.
Xingtai	To reconstruct 22 gas-fired boiler rooms, with 40 gas-fired boilers involved.
Zhangjiakou	To dismantle 158 coal-fired boilers within the project areas, with 99 small boiler rooms involved.

Table 2- List of dismantled small boilers in Chengde

No.	Location of boiler rooms	Qty.
1	Ethnic Middle School	2
2	Xinguanglian Network Company	1
3	Meteorological Bureau	2
4	Residential Buildings of Water Supply Company	1
	Total	6

Table 3- List of dismantled small boilers in Xingtai

No.	Location of boiler rooms	Qty.
1	North District of Fengchaoyuan	2
2	Fengchaoyuan	2
3	Yihai Garden	1
4	Gaojiatun Community	2
5	Yuzhuyuan	2
6	North Guozhuang	1
7	Quanbeiquan	1
8	Residential Buildings of No.3 Middle School in North Guozhuang	1
9	Residential Buildings of Xingtai Internal Revenue Service	1
10	Residential Buildings of Xingtai Health Bureau and Food and Drug Administration	1
11	North District of Fangyuan Life	1
12	Shui'an Lanting	2
13	West District of Fangyuan Life	1
14	Tuanjie Dongyuan	1
15	West District of Tuanjie Dongyuan	1

16	Yi'an Garden	5
17	Oriental Gran Via	4
18	The Second Phase of Natural City	2
19	Quandu City	1
20	Downing No. 10	2
21	Kongfu Garden	4
22	Xingtai Vocational and Technical College	2
	Total	40

Table 4- List of dismantled small boilers in Zhangjiakou

No.	Location of boiler rooms	Qty.
1	No. 1, 2, 3, 4 and New 5 Buildings on Backstreet of Wuyi Road	2
2	No. 10 Building	
3	Kaiheng Property (on South of No. 9 Building on Fu'an Street)	1
4	No. 17-31 Buildings of Garden Community	1
5	No. 1 and 2 Buildings on Fu'an South Street	1
6	No. 7 and 8 Buildings in Zhonghouli	1
7	No. 5 and 6 Buildings in Zhonghouli	1
8	No. 1 Building in Zhonghouli	1
9	Xiandai Property (between the No. 1 and 2 Buildings in Shiqingli)	1
10	Within Tiexie Primary School	1
11	Rescue Station	2
12	Cathedrol	1
13	Residential Buildings of Procuratorate	1
14	No. 1 Building of Railway (Built by Beijing Railway Bureau)	1
15	Kaiheng Property (Tuergou Community)	1
16	Kaiheng Property (Railway Cornered Street)	1
17	Behind No. 14 Building of Shengbei Garden	1
18	Behind No. 14 Building of Shengbei Garden	1
19	Within No. 90 Garden	1
20	Within the Municipal Bureau for Urban Planning	1
21	Urban Planning Institute	1
22	Beijing Railway Division (Lianchuang Mansion)	2
23	Near No. 8 Building of Junei Community	2
24	Zhangjiakou Chunyu Property Service Co., Ltd	2
25	Terminal Station of No. 9 Bus on No. 6 Lingyuan South Street	2
26	Residential Buildings of Post Office (Enabled)	1
27	Residential Buildings of Post Office on No. 2 Lingyuan South Street	1
28	The 577 Group on No. 8 Lianyuan Road	1
29	Paint Factory Yard on No. 4 Lingyuan North Street	8
30	Qiaodong Local Tax	1
31	The Business Hotel within Yijunge	1
32	Within No. 2 Railway Yard (Beijing Railway Bureau)	2
33	Kaiheng Property (within Dong'an Alley on Taiping Bridge)	1
34	Near 147 Billiard Room	1
35	Dong'an	2
36	Within the Residential Buildings of 251 Hospital	2
37	Within the Residential Buildings of 251 Hospital	1
38	Air Force Yard Community	3

39	Zhongbao Community	2
40	Residential Buildings of Development Bureau	1
41	The Seventh Construction Company of Zhangjiakou	1
42	Zhangjiakou Gas Company	1
43		1
44	Zhangjiakou Branch of China Unicom	
45	Residential Buildings of Agriculture Training College	1
46	Residential Buildings of Normal Training College	1
47	Residential Buildings of ICBC	1
48	The New No. 7 Middle School	1
49	Zhangjiakou Roads and Traffic Authority	1
50	Residential Buildings of Granary	1
51	Residential Buildings of Petroleum Company	1
52	Shengshi Huating, Wujiaohua Community	1
53	Jiahe Community	
54	Jinxia Community	
55	Residential Buildings of Fuel	
56	Railway Community, Coal Ash Line Community on No. 23 Shengnan Road	1
57	（(Beijing Railway Bureau)	
58	Residential Buildings of Post Office	2
59	Tianlun Jiayuan Community	1
60	Residential Buildings of ICBC on No. 15 51 Backstreet	1
61	No. 22 51 Backstreet (Residential Buildings of Qiaodong District Committee)	1
62	No. 8 Building on Dong'an Street, No. 69 Building on Shengli North Road	2
63	Residential Buildings of 251 Hospital	2
64	Residential Buildings of Water Conservancy Bureau and Animal Husbandry Bureau	1
65	No. 37 Jianguo Road (Residential Buildings of Unicom)	1
66	No. 38 Jianguo Road (Residential Buildings of Finance Bureau)	1
67	No. 77 Shengli North Road (Residential Buildings of Cadre's Sanitarium of Military Subarea)	1
68	Zhangjiakou Central Subbranch of People's Bank of China	1
69	No. 99 51 Street (Residential Buildings of PBC)	1
70	No. 97 51 Street (Residential Buildings of Trading Company)	1
71	No. 97 51 Street	1
72	Longteng Garden Community	1
73	Central Station of Earthquake	1
74	Residential Buildings on No. 7 Linyuan West Street	1
75	Zhangjiakou Water Supply Company	1
76	Zhangjiakou No. 10 Middle School	1
77	Martyrs Cemetery on No. 7 Linyuan Road	1
78	Linyuan Road Subbranch of Zhangjiakou Commercial Bank	3
79	(No. 9 Linyuan West Street)	
80	Zhangjiakou Dalishen Boiler Manufacturing Co., Ltd	1
81	Dongzheng Building Material & Parcel Factory	2
82	Mingchen Garden	1
83	Industrial Equipment Installing Company	1
84	No. 3, 4, 6 Buildings on Dong'an Street, No. 10 Building on Jiefang Street	1
85	Shangyuan Community	2
86	State-owned Assets Supervision and Administration Commission	1

87	Price Bureau	1
88	Zhangjiakou Hotel	1
89	Zhangjiakou General Union	1
90	Association of Suburbs	1
91	Century Supply and Marketing Cooperative	1
92	North Caiyuan 8#9#10#11#13#14#	1
93	Railway Buildings 1#2# (Beijing Railway Bureau)	2
94	Zhangjiakou Construction Bank/ Malu Street Kindergarten	2
95	No. 7#8# on First Line of Dong'an Street	1
96	No. 9 Building in Zhonghouli	1
97	No. 138 51 Street (Residential Buildings of Qiaodong Board of Education)	1
98	No. 2, 3, 4 Buildings in Zhonghouli	1
99	No. 1-5, 18#22# Buildings on Dama Road	1
100	No. 1-6 Buildings, Motor Corporation Building, Residential Buildings of Pharmaceutical Factory	1
101	Zhangjiakou Jianguo Hospital	1
102	China Unicom (Post & Telecom Hotel)	2
103	Residential Buildings of Xinhua Bookstore	1
104	Zhangjiakou Subbranch of ICBC	1
105	(Residential Buildings of ICBC)	
106	Zhangjiakou Zhongnan Construction Material Factory	1
107	No. 10 Building 51 Front Street (Residential Buildings of Zhangjiakou Technology Association)	1
108	Zhangjiakou People's Congress Administration and Registration Division	1
109	Hospital of Traditional Chinese Medicine and its Residential Buildings	1
110	Department Store	1
111	Dongsheng Grand Hotel	1
112	Zhangjiakou Hengtong City Hotel Co., Ltd	1
113	Residential Buildings of Trading Company	1
114	Fulihua Hotel	1
115	China Construction Bank Co., Ltd	1
116	Zhangjiakou Subbranch	
117	Residential Buildings of Recycling Company (the Old No. 5 and 6 Buildings on 51 Backstreet, No. 70-74 Buildings on Shengli North Road)	1
118	65 Military Compound	6
119	Zhangjiakou Internal Revenue Service	1
120	Residential Buildings of Municipal Party Committee (Enabled)	1
121	Departments of Internal Revenue Service and their Residential Buildings	1
122	65 Military Gas Station	3
123	Residential Buildings of 65 Military Chemical Defense Battalion Communication Regiment	2
124	Zhangjiakou Luxing Eco-corporation, Ltd.	1
125	Zhangjiakou Center Blood Bank	1
126	Residential Buildings of Traffic Departments	1
127	Residential Buildings of Public Utility Management Bureau	1
128	Residential Buildings of Pharmaceutical Company	1
129	Qiaodong No. 3 Kindergarten	1
130	Accessory Manufacturing Co., Ltd of Zhangjiakou Coal Mine Machinery Co., Ltd of China Coal	1
	Total	158

III. Assignment of Responsibility

Implementing Institutions: Related institutions of local government are responsible for organizing the dismantlement of small boilers.

Supervisory Institutions: The local environmental protection department is responsible for supervising the environmental impact brought by the removal work, as well as the implementation of related mitigation measures.

Monitoring Institutions: The related institutions who take charge of the removal work are responsible for monitoring PM10 at demolition sites.

IV. Impact Analysis & Management Measures

The impacts caused due to the small boilers dismantlement shall be the impact on the solid waste, the impact on surrounding atmospheric environment, and the health effect on workers. The specific impacts and its corresponding management measures are listed in **Table 5**.

As the field investigation which is done during the project preparation period shows, the boiler rooms that are planned to be closed without using asbestos materials for pipe insulation, so no impacts from asbestos fiber needs to be considered during the dismantlement.

Table 5 Environmental impact and management measures for small boilers

	Potential impact	**Management measures**
Solid Waste	Waste boilers and auxiliary equipment, heat insulation materials, slags, construction waste, cotton waste, lubricating oil and rock wool generated from the removal work.	- To store the construction waste and slags in a certain place, and then to transport them for landfills of construction waste in time. - To deal with waste boilers and auxiliary equipment, heat insulation materials, cotton waste and lubricating oil as general industrial waste. - To transport waste rock wool hermetically to waste landfills and bury them deeply as soon as possible.
Atmospheric Environment	The dust remained in the small boilers and pipes may influence the environment around the boiler rooms temporarily.	- To spray water at construction sites to reduce dust.
Wastewater	The original boilers and pipes will generate little and disperse wastewater.	- To discharge into sewers.
Health of Workers	The dust remained in the small boilers and pipes will influence workers' respiratory system.	- To spray water at construction sites to reduce dust. - To equip workers with dust masks and gloves to prevent dust and asbestos fiber.

V. Implementation Regulations

1. To make removing responsibilities clear and definite according to the principle of "the person who is in charge is responsible", and to make sure that the removal work of coal-fired boilers complete on time;

2. To confirm the removing objects and auxiliary pipes, and establish reasonable removing plans according to *Technical Supervision Regulation for Safety of Steam Boiler, Technical Specifications of Thermal Power Plant Construction and Acceptance (Chapter for Boiler Units)*, and design drawings of boilers, as well as the practical situations at sites;

3. To clear the sites before the removal work according to the characteristics at sites, removing all the constructions and barriers around which may obstruct the construction to ensure that the roads are unblocked and the equipment has enough place to store;

4. To cut off all connecting pipes as well as power lines and water pipes; to build safe and temporary water and power sources that the construction needs, and to set up temporary switchboards in the boiler rooms;

5. To discharge water in the boilers into municipal sewage pipelines, and to deal with the remaining coal or convert into money with deducting the removing costs;

6. To put boards at the allowable ranges of the construction and set up operators on duty at entrances to check each person for trespassing external person, and ensure the normal construction at sites and the safety of personnel;

7. The temporary support frames that are needed for removing large items must be secure and the hanging points must be firm to ensure the stability after incision;

8. To choose appropriate hoisting machines to hang and unload directly according to the weights and heights of boilers and headers, as well as the construction situations at sites;

9. To adopt wet-type construction during the removing processes to avoid the environmental pollution such as dust and noise, as well as to reduce the livelihood impact of surrounding residents;

10. To transport general solid waste and waste materials to the municipal waste yard. Waste materials (including boilers, grate gearboxes, air blowers, induced draft fans, flues, and waste old pipelines) will be treated by converting into money for deducting removing costs; the waste rock wool must be transported hermetically to waste landfills and be buried deeply as soon as possible;

11. To fill and level up the incomplete parts of the grounds where the boilers placed originally and clean up after the removal work;

12. The former sites of the boiler rooms should be arranged by the government or managed by heating companies;

13. To follow related procedures of cancelling boilers and get accepted by environmental protection departments.

VI. Safety Management System

1. Liability System of Safety Production

During the construction of removing boilers, we must strictly construct in a safe and civilized way. The labor protection laws and regulations shall be strictly conducted. The project manager is

generally responsible for the safety production and labor protections of the project; the technical director is responsible for the technical aspects of safety production and labor protections; the construction leader is specifically responsible for the safety production of the projects; all staff must obey the rules and regulations of safety production voluntarily.

2. Training System of Safety Production

All the managers, technicians, full-time safety officers and general workers should get corresponding training of safety production. Safety training on new workers and contract workers must be provided before construction, including safety technical knowledge and examines. Staff who pass the testes and get certifications can take up their positions.

3. Reporting System of Accidents Handling

If casualty accidents happen, lessons must be learnt from them seriously and completely eradicate the accident recurrence. The principles of “three no let off” needs to be followed when dealing with accidents; Criminal sanctions shall be taken if severe enough. After accidents, accident investigation reports need to be written with finding out reasons, summarizing lessons, establishing feasible preventive measures and providing written reports for related departments for investigation and reference.

4. Safety Management System for Site Construction

Relative operating instructions and construction technology shall be followed, and performances and operating provisions of construction machines need to be mastered to ensure safety work.

5. Safety Management System of Protective Equipment

Protective equipment for construction operators must handed out and exchanged in time according to the requirements of labor protection.

6. Civilized Construction System

Project note cards need to be used at the entrances of construction sites, with the contents including: the name of the project, construction organizations, date of commence, planned completion date, and the safety director of construction quality. We will also put up safety warnings and signs on all kinds of machines and equipment. Distribution facilities must be equipped with boxes, with doors, locks and rain-proof measures, and their ground protections must be safe and reliable.

Appendix C

Environment Monitoring Report for Plant Site of Xingtai China Coal RISUN Co. Ltd.

CMA
201203058 2U
有效期至2015年10月21日止

监 测 报 告

邢环测字(2013)第212号

项目名称：邢台旭阳煤化工有限公司10万吨/年环己烷项目、邢台旭阳焦化有限公司2×4万吨/年苯酐项目、河北中煤旭阳焦化有限公司8000万吨m3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目

委托单位：邢台旭阳煤化工有限公司

邢台市环境保护监测站

二〇一三年八月

说　明

1、　委托单位在委托前应说明监测目的，凡是污染事故调查、环保验收监测、仲裁及鉴定监测需在委托书中说明，并由我单位按规范采样、监测，否则不能作为执法依据。由委托单位自行采样送检的样品，报告只对送检样品负责。

2、　本报告无骑缝章与CMA章无效。

3、　本报告仅对本次监测结果负责，如有异议，请于一周内向本站查询。

4、　复制报告未重新加盖监测专用章与CMA章无效。

5、　本报告未经同意不得用于广告宣传。

6、　报告涂改无效。

承 担 单 位：邢台市环境保护监测站

报 告 编 写：聂东阁

审　　核：刘瑞宇

签　　发：[illegible]

监 测 人 员：聂东阁　许　鹏　孙云燕　宋丽平
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王立新　吴翠翠　李国飞　李　刚
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项目名称	邢台旭阳煤化工有限公司 10 万吨/年环己烷项目、邢台旭阳焦化有限公司 2×4 万吨/年苯酐项目、河北中煤旭阳焦化有限公司 8000 万 m^3/a SNG 项目、邢台旭阳煤化工有限公司 20 万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司 20 万吨/年焦油馏分加氢项目
委托单位	邢台旭阳煤化工有限公司
监测依据	邢台旭阳煤化工有限公司 10 万吨/年环己烷项目、邢台旭阳焦化有限公司 2×4 万吨/年苯酐项目、河北中煤旭阳焦化有限公司 8000 万 m^3/a SNG 项目、邢台旭阳煤化工有限公司 20 万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境影响评价环境质量现状监测方案
监测因子时间及频次	1、大气监测 监测点位：六个 监测频次：见监测方案 监测因子：PM_{10}、NH_3、H_2S、酚、非甲烷总烃、苯、二甲苯、SO_2 监测日期：2013 年 7 月 20 日—2013 年 7 月 26 日连续七天 2、地下水监测 监测点位：十个 监测频次：连续监测 2 天，每天采样一次 监测因子： PH、总硬度等 26 项，同时记录井深水位，详见监测方案 监测日期：2013 年 7 月 29 日—2013 年 7 月 30 日 3、声环境监测 监测点位：针对河北中煤旭阳焦化有限公司 8000 万 m3/a SNG 项目厂区四周各一个，共四个。 监测频次：监测一天，昼间、夜间各监测一次 监测因子：等效连续 A 声级 监测日期：2013 年 7 月 29 日 4、土壤环境监测 监测点位：一个 监测频次：连续监测 1 天 监测因子：PH、镉等共 9 项，详见监测方案 监测日期：2013 年 7 月 27 日
质量保证措施	各监测过程中的质量保证措施按国家环保总局颁发的《环境监测质量保证管理规定》（暂行）的要求进行，实施全过程质量保证，技术要求参见《环境水质监测质量保证手册》（第二版）及《环境大气监测质量保证手册》。气体测试仪在采样前均进行了气密性检查，流量计进行了校准，所有采样分析仪器均经计量部门检定合格，检测人员均持证上岗。

分析方法及检出限				
序号	项目	分析方法	检出限	仪器名称、编号
1	SO_2	《环境空气二氧化硫的测定甲醛吸收-副玫瑰苯胺分光光度法》 HJ 482-2009	小时浓度 0.007mg/m^3 日均浓度 0.004mg/m^3	分光光度计 VIS-7220N XHJ-DQ-52
2	PM_{10}	《环境空气 PM_{10}和$PM_{2.5}$的测定重量法》 HJ 618-2011	0.010 mg/m^3	电子天平 XHJ-BG-04
3	氨	《环境空气和废气 氨的测定纳氏试剂分光光度法》 HJ 533-2009	0.010mg/m^3	分光光度计 VIS-7220N XHJ-DQ-52
4	硫化氢	亚甲基蓝分光光度法 GB/T14678-93	0.001mg/m^3	分光光度计 VIS-722 XHJ-DQ-52
5	二甲苯	气相色谱法(HJ-583-2010)	0.003 mg/m^3	气相色谱仪 SP-3400 XHJ-YQ-4
6	苯	气相色谱法	小时浓度 0.0005mg/m^3 日均浓度 0.0002mg/m^3	气相色谱仪 SP-3400 XHJ-YQ-4
7	非甲烷总烃	气相色谱法	0.16 mg/m^3	气相色谱仪 SP-3400 XHJ-YQ-4
8	PH	玻璃电极法 GB/T6920-1986	0.01(PH 值)	PH 计 22190715
9	总硬度	EDTA 滴定法 GB7477-1987	0.05 mg/L	滴定管
10	高锰酸盐指数	酸性法 GB/T11892-1989	0.5 mg/L	水浴锅
11	溶解性总固体	溶解性总固体 称重法 《生活饮用水检验标准》	-	AY120 电子天平 XHJ-GB-2
12	氨氮	生活饮用水标准检验方法 GB5750.5-2006 9.1	0.025mg/L	分光光度计 VIS-7220N XHJ-SJ-14
13	挥发酚	4-氨基安替比林萃取光度法 HJ503-2009	0.0003 mg/L	分光光度计 VIS-7220G

分析方法及检出限				
序号	项目	分析方法	检出限	仪器名称、编号
14	硫化物	《水质 硫化物的测定 亚甲基蓝分光光度法》 GB/T 16489-1996	0.005mg/L	分光光度计 VIS-7220G XHJ-SJ-08
15	硝酸盐(以N计)	《水质 无机阴离子的测定 离子色谱法》 HJ/T 84-2001	0.08mg/L	离子色谱仪 Basic IC-882 XHJ-YQ-10
16	亚硝酸盐(以N计)	《生活饮用水标准检验方法 无机非金属指标》亚硝酸盐（氮）重氮化偶合分光光度法	0.003mg/L	分光光度计 VIS-7220G XHJ-SJ-08
17	氰化物	异烟酸-吡唑啉酮光度法 HJ484-2009	0.004mg/L	分光光度计 VIS-7220N XHJ-SJ-13
18	氯化物	《水质 无机阴离子的测定 离子色谱法》 HJ/T 84-2001	0.02mg/L	离子色谱仪 Basic IC882 XHJ-YQ-010
19	硫酸盐	离子色谱法 HJ/T84-2001	0.09 mg/L	离子色谱仪 Basic IC882 XHJ-YQ-010
20	铁	火焰原子吸收法 GB/T7475-1987	0.03 mg/l	原子吸收仪 TAS-990 XHJ-YQ-05
21	锰	火焰原子吸收法 （GB/T11911-1989）	0.01mg/l	原子吸收仪 TAS-990 XHJ-YQ-05
22	铜	石墨炉原子吸收法 GB/T5750.6-2006	5μg /L	PEAA700 XHJ-YQ-08
23	锌	火焰原子吸收法 GB/T7475-1987	0.05 mg/L	原子吸收仪 TAS-990
24	汞	原子荧光法	0.1μg / L	AFS-830 XHJ-YQ-11
25	砷	原子荧光法	0.1 u g/ L	AFS-830 XHJ-YQ-11
26	镉	石墨炉原子吸收分光光度法 GB/T7475-1987	0.0001 mg/L	PE-700 XHJ-YQ-08
27	铬（六价）	二苯碳酰二肼分光光度法 GB7466-1987	0.004mg/L	分光光度计 VIS-7220N

分析方法及检出限				
序号	项目	分析方法	检出限	仪器名称、编号
28	铅	石墨炉原子吸收法 GB7475-87	2.5μg/L	LC-10A 高效液相色谱仪 原子吸收仪 TAS-990
29	钡	石墨炉原子吸收法 GB7475-87	0.0025 mg/L	原子吸收仪 PEAA-770 XHJ-YQ-08
30	镍	火焰原子吸收法 GB/T11911-1989	0.01 mg/L	原子吸收仪 TAS-990 XHJ-YQ-05
31	钴	石墨炉原子吸收法	0.005 mg/L	原子吸收仪 PEAA-770 XHJ-YQ-08
32	钼	石墨炉原子吸收法	0.005 mg/L	原子吸收仪 PEAA-770 XHJ-YQ-08
33	镉（土）	土壤质量铅、镉的测定 石墨炉原子吸收分光光度法 GB/T17141-1997	0.01 mg/kg	原子吸收仪 PEAA-770 XHJ-YQ-08
34	汞（土）	土壤质量总汞、总砷、总铅的测定 原子荧光法 GB/T17141-1997	0.002 mg/kg	原子荧光光度计 AFS-830 型 XHJ-YQ-11
35	砷（土）	土壤质量总汞、总砷、总铅的测定 原子荧光法 GB/T17141-1997	0.2 mg/kg	原子荧光光度计 AFS-830 型 XHJ-YQ-11
36	铜（土）	土壤质量铜、锌的测定 火焰原子吸收分光光度法	1mg/kg	原子吸收仪 TAS-990
37	铅（土）	土壤质量铅、镉的测定 石墨炉原子吸收分光光度法	0.01mg/kg	原子吸收仪 PEAA-770
38	铬（土）	土壤质量总铬的测定 火焰原子吸收分光光度法	5 mg/kg	原子吸收仪 TAS-990
39	锌（土）	土壤质量铜、锌的测定 火焰原子吸收分光光度法 GB/T17138-1997	0.5 mg/kg	原子吸收仪 TAS-990 XHJ-YQ-05
40	镍（土）	火焰原子吸收法 GB/T7475-1987	5mg/kg	原子吸收仪 TAS-990 XHJ-YQ-05
41	噪声	GB3096-2008	30---130dB/A	AWA6218A+ XHJ-WRY-02

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单位：mg/L(pH除外)

点位	日期	pH	总硬度	高锰酸盐指数	溶解性总固体	氨氮	挥发酚	硫化物	硝酸盐氮	亚硝酸盐氮	氰化物	氯化物	井深（米）	水位（米）
苯加氢项目厂区北侧约200m	2013.7.29	7.49	317.3	0.78	540	0.025L	0.002L	0.005L	4.78	0.003L	0.004L	52.4	120	80
	2013.7.30	7.50	313.3	0.82	544	0.025L	0.002L	0.005L	4.76	0.003L	0.004L	52.6		
陈家屯村西	2013.7.29	7.46	271.3	0.84	446	0.025L	0.002L	0.005L	4.24	0.003L	0.004L	57.6	200	160
	2013.7.30	7.45	275.3	0.84	448	0.025L	0.002L	0.005L	4.20	0.003L	0.004L	57.8		
太平村南	2013.7.29	7.52	305.3	0.92	486	0.025L	0.002L	0.005L	4.31	0.004	0.004L	50.3	150	120
	2013.7.30	7.53	309.3	0.90	484	0.025L	0.002L	0.005L	4.35	0.004	0.004L	50.1		
中煤旭阳厂区东北侧约250m	2013.7.29	7.535	284.2	0.88	492	0.025L	0.002L	0.005L	4.46	0.003L	0.004L	53.6	180	140
	2013.7.30	7.54	280.3	0.86	490	0.025L	0.002L	0.005L	4.40	0.003L	0.004L	53.2		
中煤旭阳厂区内	2013.7.29	7.57	276.3	0.98	496	0.025L	0.002L	0.005L	5.13	0.003L	0.004L	49.7	180	140
	2013.7.30	7.56	272.3	0.96	498	0.025L	0.002L	0.005L	5.15	0.003L	0.004L	49.5		
邢台煤化工厂区内	2013.7.29	7.46	264.3	0.96	420	0.025L	0.002L	0.005L	4.76	0.003L	0.004L	52.1	200	170
	2013.7.30	7.45	268.3	0.96	422	0.025L	0.002L	0.005L	4.74	0.003L	0.004L	52.6		
石相新村南	2013.7.29	7.50	307.3	0.90	504	0.025L	0.002L	0.005L	4.52	0.003L	0.004L	54.9	130	60
	2013.7.30	7.48	304.3	0.92	506	0.025L	0.002L	0.005L	4.55	0.003L	0.004L	54.5		
石相村西	2013.7.29	7.51	300.3	0.88	510	0.025L	0.002L	0.005L	4.11	0.003L	0.004L	56.8	130	60
	2013.7.30	7.50	302.3	0.86	514	0.025L	0.002L	0.005L	4.13	0.003L	0.004L	56.2		
中煤旭阳厂区以南约700m	2013.7.29	7.55	252.3	0.94	386	0.025L	0.002L	0.005L	4.85	0.003L	0.004L	54.6	220	180
	2013.7.30	7.56	248.2	0.96	390	0.025L	0.002L	0.005L	4.82	0.003L	0.004L	54.9		
庞马村东	2013.7.29	7.48	303.3	0.82	484	0.025L	0.002L	0.005L	4.73	0.003L	0.004L	52.1	160	130
	2013.7.30	7.47	307.3	0.80	488	0.025L	0.002L	0.005L	4.70	0.003L	0.004L	52.6		

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河北中煤旭阳焦化有限公司8000万m^3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、
邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境质量现状地下水监测结果

单位：mg/L(pH除外)

点位	日期	硫酸盐	铁	锰	铜	锌	汞	砷	镉	铬（六价）	铅	钡	镍	钴	钼
苯加氢项目厂区北侧约200m	2013.7.29	57.8	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.076	0.05L	0.005L	0.005L
	2013.7.30	58.0	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.078	0.05L	0.005L	0.005L
陈家屯村西	2013.7.29	52.4	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.072	0.05L	0.005L	0.005L
	2013.7.30	52.9	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.070	0.05L	0.005L	0.005L
太平村南	2013.7.29	51.9	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.068	0.05L	0.005L	0.005L
	2013.7.30	51.7	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.065	0.05L	0.005L	0.005L
中煤旭阳厂区东北侧约250m	2013.7.29	55.0	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.076	0.05L	0.005L	0.005L
	2013.7.30	54.6	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.079	0.05L	0.005L	0.005L
中煤旭阳厂区内	2013.7.29	59.8	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.072	0.05L	0.005L	0.005L
	2013.7.30	59.6	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.070	0.05L	0.005L	0.005L
邢台煤化工厂区内	2013.7.29	52.5	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.072	0.05L	0.005L	0.005L
	2013.7.30	52.0	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.073	0.05L	0.005L	0.005L
石相新村南	2013.7.29	49.6	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.066	0.05L	0.005L	0.005L
	2013.7.30	49.2	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.068	0.05L	0.005L	0.005L
石相村西	2013.7.29	57.1	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.069	0.05L	0.005L	0.005L
	2013.7.30	57.3	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.067	0.05L	0.005L	0.005L
中煤旭阳厂区以南约700m	2013.7.29	61.3	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.073	0.05L	0.005L	0.005L
	2013.7.30	61.5	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.075	0.05L	0.005L	0.005L
庞马村东	2013.7.29	58.2	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.072	0.05L	0.005L	0.005L
	2013.7.30	58.0	0.03L	0.01L	0.005L	0.05L	0.0001L	0.0001L	0.0005L	0.004L	0.0025L	0.070	0.05L	0.005L	0.005L

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环境影响评价环境质量现状PM_{10}监测结果

单位：mg/m^3

日期	7月20日	7月21日	7月22日	7月23日	7月24日	7月25日	7月26日
1# 太平村	0.080	0.092	0.051	0.055	0.098	0.092	0.065
2# 陈家屯村	0.101	0.148	0.069	0.065	0.114	0.132	0.113
3# 庞马村	0.143	0.146	0.141	0.085	0.136	0.139	0.098
4# 石相村	0.132	0.144	0.140	0.143	0.085	0.085	0.112
5# 城界村	0.100	0.110	0.061	0.090	0.087	0.060	0.084
6# 南王段村	0.140	0.138	0.145	0.095	0.125	0.138	0.126

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单位：mg/m^3

日期	点位	SO_2				
		2:00	8:00	14:00	20:00	日均值
7月20日	1# 太平村	0.018	0.024	0.025	0.019	0.020
	2# 陈家屯村	0.033	0.015	0.022	0.019	0.021
	3# 庞马村	0.027	0.018	0.029	0.016	0.029
7月21日	1# 太平村	0.021	0.025	0.034	0.012	0.021
	2# 陈家屯村	0.015	0.030	0.017	0.020	0.029
	3# 庞马村	0.013	0.018	0.025	0.024	0.018
7月22日	1# 太平村	0.019	0.015	0.021	0.017	0.019
	2# 陈家屯村	0.020	0.013	0.019	0.026	0.020
	3# 庞马村	0.013	0.018	0.027	0.025	0.020
7月23日	1# 太平村	0.024	0.027	0.029	0.021	0.027
	2# 陈家屯村	0.068	0.063	0.078	0.054	0.059
	3# 庞马村	0.062	0.076	0.061	0.050	0.057
7月24日	1# 太平村	0.024	0.051	0.058	0.023	0.032
	2# 陈家屯村	0.060	0.067	0.077	0.065	0.064
	3# 庞马村	0.050	0.057	0.066	0.040	0.054
7月25日	1# 太平村	0.050	0.049	0.074	0.047	0.055
	2# 陈家屯村	0.073	0.071	0.079	0.051	0.065
	3# 庞马村	0.083	0.044	0.067	0.090	0.049
7月26日	1# 太平村	0.024	0.041	0.053	0.038	0.036
	2# 陈家屯村	0.065	0.069	0.063	0.088	0.070
	3# 庞马村	0.060	0.071	0.047	0.051	0.058

邢台旭阳煤化工有限公司10万吨/年环已烷项目、邢台旭阳焦化有限公司2×4万吨/年苯酐项目、河北中煤旭阳焦化有限公司8000万m^3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境影响评价环境质量现状SO_2监测结果

单位：mg/m^3

日期	点位	SO_2				
		2:00	8:00	14:00	20:00	日均值
7月20日	4# 石相村	0.029	0.024	0.013	0.019	0.018
	5# 城界村	0.015	0.017	0.014	0.020	0.015
	6# 南王段村	0.041	0.028	0.018	0.013	0.019
7月21日	4# 石相村	0.014	0.021	0.025	0.024	0.021
	5# 城界村	0.028	0.032	0.041	0.025	0.031
	6# 南王段村	0.018	0.022	0.013	0.016	0.020
7月22日	4# 石相村	0.015	0.019	0.020	0.029	0.022
	5# 城界村	0.027	0.013	0.025	0.015	0.021
	6# 南王段村	0.018	0.014	0.020	0.028	0.020
7月23日	4# 石相村	0.055	0.067	0.078	0.086	0.060
	5# 城界村	0.074	0.051	0.065	0.054	0.055
	6# 南王段村	0.063	0.050	0.052	0.075	0.053
7月24日	4# 石相村	0.073	0.064	0.065	0.059	0.061
	5# 城界村	0.053	0.051	0.067	0.064	0.057
	6# 南王段村	0.040	0.089	0.087	0.058	0.052
7月25日	4# 石相村	0.066	0.051	0.086	0.084	0.070
	5# 城界村	0.063	0.094	0.053	0.066	0.069
	6# 南王段村	0.076	0.090	0.113	0.051	0.084
7月26日	4# 石相村	0.066	0.075	0.075	0.051	0.066
	5# 城界村	0.053	0.065	0.053	0.056	0.056
	6# 南王段村	0.078	0.088	0.073	0.063	0.063

邢台旭阳煤化工有限公司10万吨/年环已烷项目、邢台旭阳焦化有限公司2×4万吨/年苯酐项目、河北中煤旭阳焦化有限公司8000万m3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境影响评价环境质量现状苯监测结果

单位：mg/m³

日期	点位	苯				
		2:00	8:00	14:00	20:00	日均值
7月20日	1# 太平村	0.011	0.009	0.003	0.013	0.009
	2# 陈家屯村	0.009	0.010	0.013	0.009	0.010
	3# 庞马村	0.014	0.011	0.008	0.010	0.011
7月21日	1# 太平村	0.013	0.010	0.011	0.004	0.010
	2# 陈家屯村	0.011	0.008	0.006	0.009	0.009
	3# 庞马村	0.004	0.006	0.013	0.007	0.008
7月22日	1# 太平村	0.003	0.012	0.015	0.007	0.009
	2# 陈家屯村	0.009	0.007	0.007	0.004	0.007
	3# 庞马村	0.010	0.010	0.013	0.012	0.011
7月23日	1# 太平村	0.008	0.007	0.009	0.002	0.007
	2# 陈家屯村	0.013	0.014	0.015	0.009	0.013
	3# 庞马村	0.004	0.010	0.010	0.007	0.008
7月24日	1# 太平村	0.007	0.003	0.012	0.008	0.008
	2# 陈家屯村	0.007	0.014	0.005	0.002	0.007
	3# 庞马村	0.008	0.012	0.014	0.010	0.011
7月25日	1# 太平村	0.013	0.014	0.004	0.003	0.009
	2# 陈家屯村	0.007	0.012	0.010	0.006	0.009
	3# 庞马村	0.013	0.004	0.015	0.008	0.010
7月26日	1# 太平村	0.006	0.012	0.013	0.011	0.011
	2# 陈家屯村	0.007	0.006	0.007	0.005	0.006
	3# 庞马村	0.005	0.008	0.004	0.006	0.006

邢台旭阳煤化工有限公司10万吨/年环已烷项目、邢台旭阳焦化有限公司2×4万吨/年苯酐项目、河北中煤旭阳焦化有限公司8000万m^3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境影响评价环境质量现状苯监测结果

单位：mg/m^3

日期	点位	苯				
		2:00	8:00	14:00	20:00	日均值
7月20日	4# 石相村	0.003	0.008	0.008	0.011	0.008
	5# 城界村	0.006	0.014	0.012	0.012	0.011
	6# 南王段村	0.006	0.010	0.014	0.005	0.009
7月21日	4# 石相村	0.007	0.009	0.014	0.014	0.011
	5# 城界村	0.004	0.008	0.010	0.014	0.009
	6# 南王段村	0.012	0.004	0.009	0.002	0.007
7月22日	4# 石相村	0.014	0.012	0.010	0.008	0.011
	5# 城界村	0.003	0.007	0.006	0.003	0.005
	6# 南王段村	0.004	0.006	0.008	0.003	0.005
7月23日	4# 石相村	0.015	0.013	0.005	0.009	0.011
	5# 城界村	0.010	0.009	0.008	0.014	0.010
	6# 南王段村	0.011	0.006	0.004	0.011	0.008
7月24日	4# 石相村	0.003	0.009	0.010	0.007	0.007
	5# 城界村	0.003	0.013	0.004	0.011	0.008
	6# 南王段村	0.010	0.002	0.006	0.002	0.005
7月25日	4# 石相村	0.008	0.010	0.006	0.004	0.007
	5# 城界村	0.006	0.007	0.009	0.004	0.007
	6# 南王段村	0.012	0.003	0.006	0.011	0.008
7月26日	4# 石相村	0.004	0.008	0.003	0.008	0.006
	5# 城界村	0.005	0.007	0.002	0.010	0.006
	6# 南王段村	0.005	0.007	0.002	0.010	0.006

邢台旭阳煤化工有限公司10万吨/年环已烷项目、邢台旭阳焦化有限公司2×4万吨/年苯酐项目、河北中煤旭阳焦化有限公司8000万m3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境影响评价环境质量现状非甲烷总烃监测结果

单位：mg/m³

日期	点位	非甲烷总烃			
		2:00	8:00	14:00	20:00
7月20日	1# 太平村	0.6	0.5	0.3	0.3
	2# 陈家屯村	0.3	0.4	0.2	0.4
	3# 庞马村	0.4	0.3	1.3	0.3
7月21日	1# 太平村	0.3	0.6	0.6	0.5
	2# 陈家屯村	0.3	0.2	0.3	0.4
	3# 庞马村	1.3	0.9	0.4	0.4
7月22日	1# 太平村	0.2	0.3	0.3	0.2
	2# 陈家屯村	0.4	0.8	0.3	0.4
	3# 庞马村	0.4	1.3	0.7	0.7
7月23日	1# 太平村	0.5	0.3	0.5	0.3
	2# 陈家屯村	0.3	0.5	0.8	0.3
	3# 庞马村	0.8	0.9	0.8	0.4
7月24日	1# 太平村	0.3	0.4	0.7	0.9
	2# 陈家屯村	0.4	0.6	0.4	0.3
	3# 庞马村	0.8	0.3	0.2	0.3
7月25日	1# 太平村	0.3	0.4	0.7	1.0
	2# 陈家屯村	0.3	0.3	0.5	0.3
	3# 庞马村	0.3	0.4	0.3	0.4
7月26日	1# 太平村	0.4	0.5	0.3	0.7
	2# 陈家屯村	0.5	0.5	0.6	0.4
	3# 庞马村	0.4	0.3	0.5	0.7

邢台旭阳煤化工有限公司10万吨/年环已烷项目、邢台旭阳焦化有限公司2×4万吨/年苯酐项目、河北中煤旭阳焦化有限公司8000万m3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境影响评价环境质量现状非甲烷总烃监测结果

单位：mg/m^3

日期	点位	非甲烷总烃			
		2:00	8:00	14:00	20:00
7月20日	4# 石相村	1.3	1.4	0.9	1.5
	5# 城界村	0.3	0.6	0.6	0.5
	6# 南王段村	0.3	0.3	0.5	0.6
7月21日	4# 石相村	0.9	1.6	1.3	1.4
	5# 城界村	0.8	0.6	1.4	1.0
	6# 南王段村	0.5	0.7	0.3	0.5
7月22日	4# 石相村	1.0	1.3	1.2	0.9
	5# 城界村	0.6	0.4	0.5	0.2
	6# 南王段村	0.5	0.8	0.6	0.2
7月23日	4# 石相村	0.3	0.6	0.7	0.5
	5# 城界村	0.3	0.5	0.3	0.8
	6# 南王段村	0.3	0.5	0.8	0.3
7月24日	4# 石相村	0.4	0.7	0.5	0.6
	5# 城界村	0.3	0.4	0.5	0.3
	6# 南王段村	0.7	0.4	0.2	0.6
7月25日	4# 石相村	0.3	1.3	0.4	0.3
	5# 城界村	0.7	0.5	0.4	0.3
	6# 南王段村	0.2	0.7	0.5	0.6
7月26日	4# 石相村	0.4	0.3	0.4	0.6
	5# 城界村	0.4	0.2	0.4	0.7
	6# 南王段村	0.3	0.7	0.3	0.2

邢台旭阳煤化工有限公司10万吨/年环已烷项目、邢台旭阳焦化有限公司2×4万吨/年苯酐项目、河北中煤旭阳焦化有限公司8000万m^3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境影响评价环境质量现状NH_3监测结果

单位：mg/m^3

日期	点位	NH_3			
		2:00	8:00	14:00	20:00
7月20日	1# 太平村	0.180	0.123	0.090	0.054
	2# 陈家屯村	0.170	0.142	0.117	0.089
	3# 庞马村	0.173	0.147	0.147	0.167
	4# 石相村	0.027	0.032	0.174	0.108
7月21日	1# 太平村	0.043	0.088	0.171	0.170
	2# 陈家屯村	0.131	0.160	0.131	0.132
	3# 庞马村	0.134	0.152	0.130	0.150
	4# 石相村	0.094	0.169	0.136	0.124
7月22日	1# 太平村	0.091	0.032	0.184	0.158
	2# 陈家屯村	0.189	0.187	0.123	0.189
	3# 庞马村	0.168	0.182	0.183	0.024
	4# 石相村	0.128	0.138	0.062	0.189
7月23日	1# 太平村	0.144	0.186	0.118	0.189
	2# 陈家屯村	0.158	0.055	0.187	0.191
	3# 庞马村	0.124	0.133	0.124	0.154
	4# 石相村	0.084	0.029	0.097	0.151
7月24日	1# 太平村	0.178	0.173	0.156	0.028
	2# 陈家屯村	0.051	0.144	0.164	0.109
	3# 庞马村	0.043	0.158	0.169	0.169
	4# 石相村	0.159	0.197	0.142	0.115
7月25日	1# 太平村	0.189	0.166	0.158	0.166
	2# 陈家屯村	0.190	0.137	0.139	0.064
	3# 庞马村	0.187	0.145	0.141	0.046
	4# 石相村	0.146	0.065	0.106	0.059
7月26日	1# 太平村	0.051	0.126	0.189	0.158
	2# 陈家屯村	0.184	0.186	0.114	0.150
	3# 庞马村	0.165	0.158	0.187	0.105
	4# 石相村	0.094	0.091	0.107	0.139

邢台旭阳煤化工有限公司10万吨/年环已烷项目、邢台旭阳焦化有限公司2×4万吨/年苯酐项目、河北中煤旭阳焦化有限公司8000万m^3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境影响评价环境质量现状H_2S监测结果

单位：mg/m^3

日期	点位	H_2S			
		2:00	8:00	14:00	20:00
7月20日	1# 太平村	0.004	0.008	0.007	0.008
	2# 陈家屯村	0.002	0.005	0.003	0.003
	3# 庞马村	0.005	0.003	0.003	0.007
	4# 石相村	0.007	0.008	0.008	0.006
7月21日	1# 太平村	0.006	0.007	0.002	0.009
	2# 陈家屯村	0.008	0.003	0.009	0.003
	3# 庞马村	0.003	0.002	0.004	0.003
	4# 石相村	0.005	0.006	0.008	0.010
7月22日	1# 太平村	0.008	0.008	0.007	0.005
	2# 陈家屯村	0.003	0.006	0.006	0.008
	3# 庞马村	0.007	0.008	0.006	0.003
	4# 石相村	0.007	0.002	0.004	0.007
7月23日	1# 太平村	0.004	0.005	0.003	0.004
	2# 陈家屯村	0.003	0.003	0.002	0.004
	3# 庞马村	0.003	0.004	0.004	0.009
	4# 石相村	0.005	0.003	0.002	0.002
7月24日	1# 太平村	0.003	0.002	0.009	0.003
	2# 陈家屯村	0.005	0.003	0.004	0.003
	3# 庞马村	0.006	0.002	0.002	0.003
	4# 石相村	0.009	0.002	0.004	0.002
7月25日	1# 太平村	0.002	0.003	0.003	0.006
	2# 陈家屯村	0.005	0.003	0.003	0.003
	3# 庞马村	0.003	0.004	0.004	0.003
	4# 石相村	0.003	0.004	0.003	0.005
7月26日	1# 太平村	0.009	0.006	0.005	0.002
	2# 陈家屯村	0.004	0.003	0.003	0.002
	3# 庞马村	0.005	0.006	0.004	0.003
	4# 石相村	0.004	0.003	0.002	0.006

邢台旭阳煤化工有限公司10万吨/年环已烷项目、邢台旭阳焦化有限公司2×4万吨/年苯酐项目、河北中煤旭阳焦化有限公司8000万m3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境影响评价环境质量现状二甲苯监测结果

单位：mg/m^3

日期	点位	二甲苯			
		2:00	8:00	14:00	20:00
7月20日	1# 太平村	<0.003	<0.003	<0.003	<0.003
	2# 陈家屯村	<0.003	<0.003	<0.003	<0.003
	3# 庞马村	<0.003	<0.003	<0.003	<0.003
	4# 石相村	<0.003	<0.003	<0.003	<0.003
7月21日	1# 太平村	<0.003	<0.003	<0.003	<0.003
	2# 陈家屯村	<0.003	<0.003	<0.003	<0.003
	3# 庞马村	<0.003	<0.003	<0.003	<0.003
	4# 石相村	<0.003	<0.003	<0.003	<0.003
7月22日	1# 太平村	<0.003	<0.003	<0.003	<0.003
	2# 陈家屯村	<0.003	<0.003	<0.003	<0.003
	3# 庞马村	<0.003	<0.003	<0.003	<0.003
	4# 石相村	<0.003	<0.003	<0.003	<0.003
7月23日	1# 太平村	<0.003	<0.003	<0.003	<0.003
	2# 陈家屯村	<0.003	<0.003	<0.003	<0.003
	3# 庞马村	<0.003	<0.003	<0.003	<0.003
	4# 石相村	<0.003	<0.003	<0.003	<0.003
7月24日	1# 太平村	<0.003	<0.003	<0.003	<0.003
	2# 陈家屯村	<0.003	<0.003	<0.003	<0.003
	3# 庞马村	<0.003	<0.003	<0.003	<0.003
	4# 石相村	<0.003	<0.003	<0.003	<0.003
7月25日	1# 太平村	<0.003	<0.003	<0.003	<0.003
	2# 陈家屯村	<0.003	<0.003	<0.003	<0.003
	3# 庞马村	<0.003	<0.003	<0.003	<0.003
	4# 石相村	<0.003	<0.003	<0.003	<0.003
7月26日	1# 太平村	<0.003	<0.003	<0.003	<0.003
	2# 陈家屯村	<0.003	<0.003	<0.003	<0.003
	3# 庞马村	<0.003	<0.003	<0.003	<0.003
	4# 石相村	<0.003	<0.003	<0.003	<0.003

邢台旭阳煤化工有限公司10万吨/年环已烷项目、邢台旭阳焦化有限公司2×4万吨/年苯酐项目、河北中煤旭阳焦化有限公司8000万m3/a SNG项目、邢台旭阳煤化工有限公司20万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司20万吨/年焦油馏分加氢项目环境影响评价环境质量现状酚监测结果

单位：mg/m^3

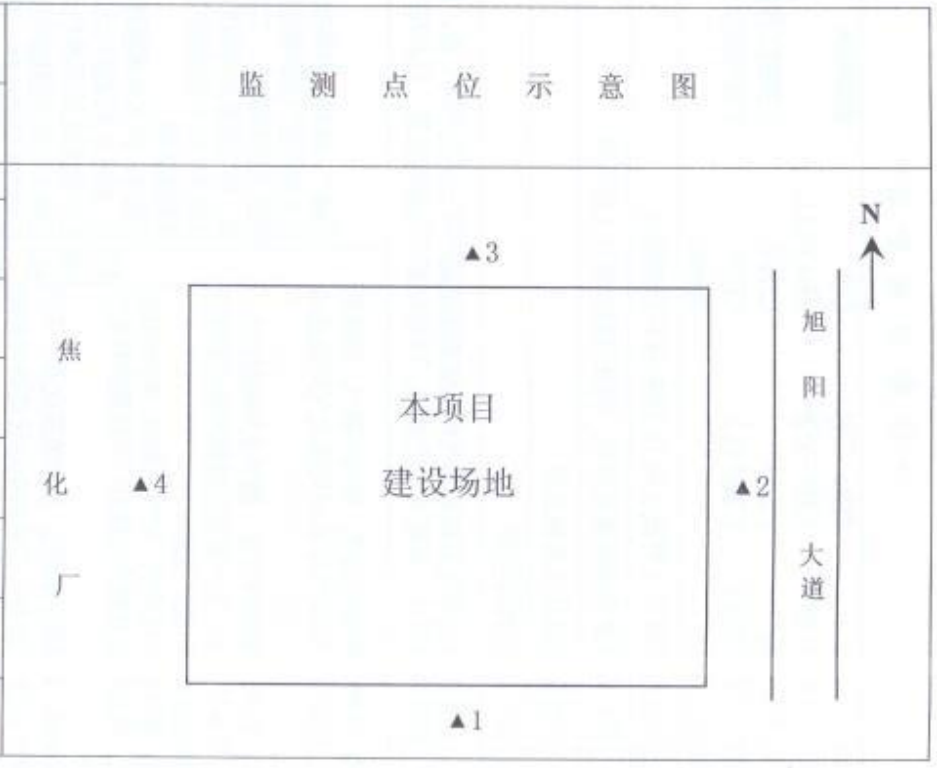
日期	点位	酚				
		2:00	8:00	14:00	20:00	日均
7月20日	3# 庞马村	<0.01	<0.01	<0.01	<0.01	<0.01
	4# 石相村	<0.01	<0.01	<0.01	<0.01	<0.01
	5# 城界村	<0.01	<0.01	<0.01	<0.01	<0.01
	6# 南王段村	<0.01	<0.01	<0.01	<0.01	<0.01
7月21日	3# 庞马村	<0.01	<0.01	<0.01	<0.01	<0.01
	4# 石相村	<0.01	<0.01	<0.01	<0.01	<0.01
	5# 城界村	<0.01	<0.01	<0.01	<0.01	<0.01
	6# 南王段村	<0.01	<0.01	<0.01	<0.01	<0.01
7月22日	3# 庞马村	<0.01	<0.01	<0.01	<0.01	<0.01
	4# 石相村	<0.01	<0.01	<0.01	<0.01	<0.01
	5# 城界村	<0.01	<0.01	<0.01	<0.01	<0.01
	6# 南王段村	<0.01	<0.01	<0.01	<0.01	<0.01
7月23日	3# 庞马村	<0.01	<0.01	<0.01	<0.01	<0.01
	4# 石相村	<0.01	<0.01	<0.01	<0.01	<0.01
	5# 城界村	<0.01	<0.01	<0.01	<0.01	<0.01
	6# 南王段村	<0.01	<0.01	<0.01	<0.01	<0.01
7月24日	3# 庞马村	<0.01	<0.01	<0.01	<0.01	<0.01
	4# 石相村	<0.01	<0.01	<0.01	<0.01	<0.01
	5# 城界村	<0.01	<0.01	<0.01	<0.01	<0.01
	6# 南王段村	<0.01	<0.01	<0.01	<0.01	<0.01
7月25日	3# 庞马村	<0.01	<0.01	<0.01	<0.01	<0.01
	4# 石相村	<0.01	<0.01	<0.01	<0.01	<0.01
	5# 城界村	<0.01	<0.01	<0.01	<0.01	<0.01
	6# 南王段村	<0.01	<0.01	<0.01	<0.01	<0.01
7月26日	3# 庞马村	<0.01	<0.01	<0.01	<0.01	<0.01
	4# 石相村	<0.01	<0.01	<0.01	<0.01	<0.01
	5# 城界村	<0.01	<0.01	<0.01	<0.01	<0.01
	6# 南王段村	<0.01	<0.01	<0.01	<0.01	<0.01

河北中煤旭阳焦化有限公司 8000 万 m^3/a SNG 项目声环境质量现状监测

监测结果

测量时间：2013 年 07 月 29 日

测量时间	监测点位	监测结果 dB(A)					监测点位示意图
		L_{eq}	L_{10}	L_{50}	L_{90}	SD	
16：45	▲1	52.4	55.5	50.9	48.5	2.6	
22：18		46.6	48.1	46.1	44.1	1.6	
16：32	▲2	56.3	58.0	54.5	52.8	2.5	
22：05		48.9	50.4	48.2	46.8	1.6	
16：19	▲3	54.1	56.1	53.7	51.0	1.9	
22：47		49.6	51.1	49.1	47.1	1.4	
15：44	▲4	49.2	50.2	48.4	47.2	1.5	
23：00		49.3	51.0	48.8	47.2	1.5	



邢台旭阳煤化工有限公司 10 万吨/年环已烷项目、邢台旭阳焦化有限公司 2×4 万吨/年苯酐项目、河北中煤旭阳焦化有限公司 8000 万 m3/a SNG 项目、邢台旭阳煤化工有限公司 20 万吨/年粗苯加氢精制项目、邢台旭阳煤化工有限公司 20 万吨/年焦油馏分加氢项目环境影响评价环境质量现状土壤监测结果

单位：mg/kg(pH 除外)

点位	日期	pH	镍	铅	锌	铬	砷	铜	镉	汞
中煤旭阳厂区东侧 100m 农田	2013.7.27	7.89	49.25	18.6	90.66	63.25	22.04	25.26	0.12	0.037

CMA

2012030582U

有效期至2015年10月21日止

监 测 报 告

邢环测字(2013)第 429 号

项目名称：河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状监测

委托单位：河北中煤旭阳焦化有限公司

邢台市环境保护监测站

二〇一三年十二月

说　　明

1、　委托单位在委托前应说明监测目的，凡是污染事故调查、环保验收监测、环境影响评价、仲裁及鉴定监测需在委托书中说明，并由我单位按规范采样、监测，否则不能作为执法依据。由委托单位自行采样送检的样品，报告只对送检样品负责。

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承　担　单　位：　邢台市环境保护监测站

报　告　编　写：

审　　核：

签　　发：

监　测　人　员：王红磊　　王彬宇　　王玉龙　　万正伟

刘　磊　　田福辰

邢台市环境保护监测站

电　　话:0319—2058114

传　　真:0319—2586323

邮　　编:054000

地　　址:邢台市公园东街 998 号青青家园

项目名称	河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状监测
委托单位	河北中煤旭阳焦化有限公司
监测依据	河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状监测方案
监测因子时间及频次	1、大气监测： 监测点位：六个， 监测因子：SO_2、NO_2、PM_{10}、苯、酚、氨、非甲烷总烃、硫化氢、氰化氢、苯并芘 监测时间及频次：见监测方案 监测日期：2013 年 11 月 11 日~2013 年 11 月 18 日连续七天 2、声环境监测 监测点位：六个 监测频次：监测一天，昼间、夜间分别监测 监测因子：等效连续 A 声级 监测日期：2013 年 11 月 14 日
质量保证措施	各监测过程中的质量保证措施按国家环保总局颁发的《环境监测质量保证管理规定》（暂行）的要求进行，实施全过程质量保证，技术要求参见《环境水质监测质量保证手册》（第二版）及《环境大气监测质量保证手册》。气体测试仪在采样前均进行了气密性检查，流量计进行了校准，所有采样分析仪器均经计量部门检定合格，检测人员均持证上岗。

分析方法及检出限				
序号	项目	分析方法	检出限	仪器名称、编号
1、	SO_2	环境空气 二氧化硫的测定甲醛吸收-副玫瑰苯胺分光光度法 HJ 482-2009	1 小时平均 0.007mg/m^3 24 小时平均 0.004mg/m^3	UV-9600 紫外可见分光光度计
2、	NO_2	环境空气 氮氧化物（一氧化氮和二氧化氮）的测定盐酸萘乙二胺分光光度法 HJ 479-2009	1 小时平均 0.005mg/m^3 24 小时平均 0.003mg/m^3	
3、	PM_{10}	环境空气 PM10 和 PM2.5 的测定 重量法 HJ618-2011	0.001mg/m^3	BAS124S-CW 型电子天平
4、	氨	《环境空气和废气 氨的测定 纳氏试剂分光光度法》HJ533-2009	0.01 mg/m^3	UV-9600 紫外可见分光光度计
5、	硫化氢	《空气和废气监测分析方法》第四版增补版	0.001 mg/m^3	
6、	苯	《环境空气苯系物的测定 固体吸附/热脱附-气相色谱法》HJ583-2010	5.0×10^{-4} mg/m^3	GC9790 II 型气相色谱仪
7、	酚	《固定污染源排气中酚类化合物的测定 4-氨基安替比林分光光度法》HJ/T32-1999	0.003mg/m^3	UV-9600 紫外可见分光光度计
8、	氰化氢	《固定污染源排气中氰化氢的测定 异烟酸-吡唑啉酮分光光度法》HJ/T28-1999	2.0×10^{-3} mg/m^3	
9、	B[a]P	《环境空气 苯并（a）芘的测定 高效液相色谱法》GB/T15439-1995	6.0×10^{-5} μg/Nm^3	液相色谱仪
10、	非甲烷总烃	《空气和废气监测分析方法》（第四版增补版）气相色谱法	0.2ng（以甲烷计）	GC9790 II 型气相色谱仪
11、	噪声	《声环境质量标准》（GB3096-2008）	—	AWA6218B 型噪声统计分析仪 XHJ-WR-02

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状苯监测结果

单位：mg/m^3

日期	点位	苯			
		02:00	08:00	14:00	20:00
11.12	北景家屯村	0.0302	0.0346	0.0287	0.0216
11.13	北景家屯村	0.0150	0.0173	0.0142	0.0175
11.14	北景家屯村	0.0615	0.0970	0.0200	0.0218
11.15	北景家屯村	0.0090	0.0057	0.0082	0.0122
11.16	北景家屯村	0.0015	0.0014	0.0027	ND
11.17	北景家屯村	0.0166	0.0325	0.0059	0.0049
11.18	北景家屯村	0.0251	0.0243	0.0202	0.0170

注：“ND”表示未检出

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状酚监测结果

单位：mg/m^3

日期	点位	酚			
		02:00	08:00	14:00	20:00
11.12	北景家屯村	0.022	0.018	0.021	0.028
11.13	北景家屯村	0.039	0.035	0.023	0.035
11.14	北景家屯村	0.021	0.013	0.018	0.020
11.15	北景家屯村	0.020	0.025	0.016	0.026
11.16	北景家屯村	0.013	0.016	0.023	0.013
11.17	北景家屯村	0.013	0.016	0.018	0.015
11.18	北景家屯村	0.013	0.015	0.021	0.013

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状氨监测结果

单位：mg/m^3

日期	点位	氨			
		02:00	08:00	14:00	20:00
11.12	北景家屯村	0.072	0.037	0.175	0.095
11.13	北景家屯村	0.168	0.132	0.121	0.084
11.14	北景家屯村	0.179	0.097	0.050	0.109
11.15	北景家屯村	0.025	0.162	0.053	0.036
11.16	北景家屯村	0.012	0.008	0.010	ND
11.17	北景家屯村	ND	ND	ND	ND
11.18	北景家屯村	0.048	0.072	0.012	0.050

注：“ND”表示未检出

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状硫化氢监测结果

单位：mg/m^3

日期	点位	硫化氢			
		02:00	08:00	14:00	20:00
11.12	北景家屯村	0.008	0.006	0.007	0.007
11.13	北景家屯村	0.009	0.003	0.005	0.001
11.14	北景家屯村	0.007	0.008	0.007	0.004
11.15	北景家屯村	0.006	0.009	0.006	0.003
11.16	北景家屯村	0.002	0.002	0.003	0.002
11.17	北景家屯村	0.002	0.001	0.002	0.003
11.18	北景家屯村	0.003	0.001	0.002	0.004

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状非甲烷总烃监测结果

单位：mg/m^3

日期	点位	非甲烷总烃			
		02:00	08:00	14:00	20:00
11.12	北景家屯村	0.4	0.6	0.4	0.7
11.13	北景家屯村	0.4	0.5	0.6	0.3
11.14	北景家屯村	0.8	1.0	1.1	0.7
11.15	北景家屯村	0.8	0.6	0.6	0.6
11.16	北景家屯村	0.6	0.7	0.6	0.6
11.17	北景家屯村	0.7	0.9	0.6	0.6
11.18	北景家屯村	1.0	1.1	0.6	0.8

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状氰化氢监测结果

单位：mg/m^3

日期	点位	氰化氢			
		02:00	08:00	14:00	20:00
11.12	石相村	ND	ND	ND	ND
	南王段村	ND	ND	ND	ND
	太平村	ND	ND	ND	ND
11.13	石相村	ND	ND	ND	ND
	南王段村	ND	ND	ND	ND
	太平村	ND	ND	ND	ND
11.14	石相村	ND	ND	ND	ND
	南王段村	ND	ND	ND	ND
	太平村	ND	ND	ND	ND
11.15	石相村	ND	ND	ND	ND
	南王段村	ND	ND	ND	ND
	太平村	ND	ND	ND	ND
11.16	石相村	ND	ND	ND	ND
	南王段村	ND	ND	ND	ND
	太平村	ND	ND	ND	ND
11.17	石相村	ND	ND	ND	ND
	南王段村	ND	ND	ND	ND
	太平村	ND	ND	ND	ND
11.18	石相村	ND	ND	ND	ND
	南王段村	ND	ND	ND	ND
	太平村	ND	ND	ND	ND

注：“ND”表示未检出

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状氰化氢监测结果

单位：mg/m^3

日期	点位	氰化氢			
		02:00	08:00	14:00	20:00
11.12	城界村	ND	ND	ND	ND
	庞马村	ND	ND	ND	ND
	北景家屯村	ND	ND	ND	ND
11.13	城界村	ND	ND	ND	ND
	庞马村	ND	ND	ND	ND
	北景家屯村	ND	ND	ND	ND
11.14	城界村	ND	ND	ND	ND
	庞马村	ND	ND	ND	ND
	北景家屯村	ND	ND	ND	ND
11.15	城界村	ND	ND	ND	ND
	庞马村	ND	ND	ND	ND
	北景家屯村	ND	ND	ND	ND
11.16	城界村	ND	ND	ND	ND
	庞马村	ND	ND	ND	ND
	北景家屯村	ND	ND	ND	ND
11.17	城界村	ND	ND	ND	ND
	庞马村	ND	ND	ND	ND
	北景家屯村	ND	ND	ND	ND
11.18	城界村	ND	ND	ND	ND
	庞马村	ND	ND	ND	ND
	北景家屯村	ND	ND	ND	ND

注：“ND”表示未检出

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状苯并芘监测结果

单位：μg/m³

日期	苯并芘					
	石相村	南王段村	太平村	城界村	庞马村	北景家屯村
11.11	0.00226	0.00117	0.00128	0.00168	0.00189	0.00187
11.12	0.00215	0.00137	0.00198	0.00136	0.00157	0.00159
11.13	0.00233	0.00135	0.00177	0.00141	0.00166	0.00187
11.14	0.00179	0.00167	0.00207	0.00129	0.00139	0.00159
11.15	0.00234	0.00149	0.00176	0.00146	0.00147	0.00196
11.16	0.00226	0.00126	0.00179	0.00198	0.00188	0.00146
11.17	0.00218	0.00129	0.00178	0.00126	0.00186	0.00168

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状PM_{10}监测结果

单位：mg/m^3

日期	点位	PM_{10}
2013.11.12—11.13	北景家屯村	0.338
2013.11.13—11.14	北景家屯村	0.260
2013.11.14—11.15	北景家屯村	0.316
2013.11.15—11.16	北景家屯村	0.367
2013.11.16—11.17	北景家屯村	0.288
2013.11.17—11.18	北景家屯村	0.244
2013.11.18—11.19	北景家屯村	0.334

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状SO_2监测结果

单位：mg/m^3

日期	点位	SO_2				
		02:00	08:00	14:00	20:00	日均
11.12	北景家屯村	0.104	0.131	0.179	0.073	0.031
11.13	北景家屯村	0.028	0.029	0.046	0.028	0.034
11.14	北景家屯村	0.023	0.051	0.041	0.111	0.024
11.15	北景家屯村	0.079	0.064	0.108	0.061	0.070
11.16	北景家屯村	0.020	0.017	0.027	0.058	0.029
11.17	北景家屯村	0.122	0.125	0.035	0.090	0.065
11.18	北景家屯村	0.150	0.155	0.169	0.263	0.078

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状NO_2监测结果

单位：mg/m^3

日期	点位	NO_2				
		02:00	08:00	14:00	20:00	日均
11.12	北景家屯村	0.068	0.083	0.077	0.066	0.060
11.13	北景家屯村	0.075	0.094	0.107	0.056	0.078
11.14	北景家屯村	0.100	0.114	0.055	0.072	0.068
11.15	北景家屯村	0.057	0.073	0.096	0.099	0.076
11.16	北景家屯村	0.020	0.024	0.022	0.030	0.051
11.17	北景家屯村	0.071	0.073	0.071	0.071	0.073
11.18	北景家屯村	0.083	0.077	0.080	0.104	0.075

河北中煤旭阳焦化有限公司（三期、四期工程）后评价环境质量现状厂界噪声监测结果

测量时间：2013 年 11 月 14 日

监测时间	监测点位	监测结果（dB(A)）
昼间	东北厂界	57.2
夜间		46.8
昼间	东南厂界	53.5
夜间		47.5
昼间	南厂界	57.5
夜间		48.3
昼间	西南厂界	55.5
夜间		48.8
昼间	西北厂界	53.8
夜间		48.5
昼间	北厂界	52.4
夜间		47.6

监 测 报 告

邢环测字(2014)第223号

项目名称：河北邢台县旭阳经济开发区总体规划环境质量现状监测

委托单位：河北省众联能源环保科技有限公司

邢台市环境监测站

二〇一四年七月

说　　明

1、　委托单位在委托前应说明监测目的，凡是污染事故调查、环保验收监测、仲裁及鉴定监测需在委托书中说明，并由我单位按规范采样、监测，否则不能作为执法依据。由委托单位自行采样送检的样品，报告只对送检样品负责。

2、　本报告无骑缝章与CMA章无效。

3、　本报告仅对本次监测结果负责，如有异议，请于一周内向本站查询。

4、　复制报告未重新加盖监测专用章与CMA章无效。

5、　本报告未经同意不得用于广告宣传。

6、　报告涂改无效。

承　担　单　位：　邢台市环境监测站

报　告　编　写：　张倩

审　　核：　刘瑶宇

签　　发：　[illegible]

监　测　人　员：孙云燕　李旭阳　张　倩　雷飞达
赵志强　李国飞　李　刚　郑　帅
李彬彬　陈　炜　周琳琳　刘雅楠
孙云燕　任丽丹　王淑兰　张　慧
杨雪丽　焦丽丽　吴翠翠　田福晨

邢台市环境监测站

电　　话:0319—2058114

传　　真:0319—2586323

邮　　编:054000

地　　址:邢台市公园东街 998 号滨河青青家园

项目名称	河北邢台县旭阳经济开发区总体规划
委托单位	河北省众联能源环保科技有限公司
监测依据	旭阳（邢台）工业聚集区总体规划环境质量现状监测方案
监测因子时间及频次	1、大气监测 监测点位：六个 监测频次：见监测方案 监测因子：PM_{10}、SO_2、NO_2、B[a]P、苯、TVOC、Pb、H_2SO_4、NH_3、二甲苯、H_2S、酚、HCL 甲醇 监测日期：2014 年 3 月 25 日~2014 年 3 月 31 日连续七天 2、地下水监测 监测点位：七个 监测频次：见监测方案 监测因子：PH、高锰酸盐指数、溶解性总固体、总硬度、氨氮、硝酸盐（以 N 计）、亚硝酸盐（以 N 计）、硫酸盐、氟化物、氯化物、氰化物、挥发酚、铬（六价）、汞、镉、铅、砷、铜、锌、镍、甲醇、苯。 监测日期：2014 年 3 月 26 日 3、声环境监测 监测点位：三个 监测频次：见监测方案 监测因子：等效连续 A 声级 监测日期：2014 年 3 月 26 日 4 土壤环境监测 监测点位：两个 监测频次：见监测方案 监测因子：pH、阳离子交换量、铜、铅、锌、铬、砷、镍、镉、汞 监测日期：2014 年 3 月 24 日
质量保证措施	各监测过程中的质量保证措施按《环境监测质量管理技术导则》（HJ630-2011）的要求进行，实施全过程质量保证，技术要求参见《地下水环境监测技术规范》（HJ/T164-2004）、《环境空气质量手工监测技术规范》（HJ/T194-2005）及《环境噪声监测技术规范》（HJ640-2012）。气体测试仪在采样前均进行了气密性检查，流量进行了校准，所有采样分析仪器均经计量部门检定合格，检测人员均持证上岗。

土壤分析方法及检出限				
序号	项目	分析方法	检出限	仪器名称、编号
1	pH	玻璃电极法 GB/T6920-1986	—	pH 计 XHJ-SJ-16
2	铅	石墨炉原子吸收法 GB17141-1997	0.1mg/kg	原子吸收仪 PEAA700 XHJ-YQ-08
3	镉	石墨炉原子吸收法 GB17141-1997	0.01 mg/kg	原子吸收仪 PEAA700 XHJ-YQ-08
4	砷	原子荧光光度法 《全国土壤污染状况调查技术规定》	0.015mg/kg	原子荧光光度计 AFS-830 XHJ-YQ-11
5	汞	原子荧光光度法 《全国土壤污染状况调查技术规定》	0.0002mg/kg	原子荧光光度计 AFS-830 XHJ-YQ-11
6	铬	火焰原子吸收法 HJ491-2009	5.0mg/kg	原子吸收仪 TAS-990 XHJ-YQ-05
7	锌	火焰原子吸收 GB/T17138-1997	0.5mg/kg	原子吸收仪 TAS-990 XHJ-YQ-05
8	镍	火焰原子吸收 GB/T17139-1997	5mg/kg	原子吸收仪 TAS-990 XHJ-YQ-05

声环境分析方法及检出限				
序号	项目	分析方法	检出限	仪器名称、编号
1	噪声	《声环境质量标准》 GB3096-2008	--	AWA6218B XHJ-WRY-12

地下水方法及检出限				
序号	项目	分析方法	检出限	仪器名称、编号
1	甲醇	《空气和废气监测分析方法》 （第四版增补版）	0.4 mg/L	气相色谱仪 SP-3400 北分 XHJ-YQ-4
2	苯	《水质 苯系物的测定 气相色谱法》GB11890-89	0.005 mg/L	气相色谱仪 岛津 GC-2010 XHJ-YQ-08

地下水方法及检出限				
序号	项目	分析方法	检出限	仪器名称、编号
3	高锰酸盐指数	酸性高锰酸钾滴定法 GB/T5750.7-2006 中 1.1	0.05 mg/L	滴定管
4	溶解性总固体	重量法 GB / T 5750.4-2006 中 8.1	--	AY120 电子天平 XHJ-BG-2
5	氯化物	离子色谱法 HJ/T84-2001	0.02mg/L	离子色谱仪 Basic IC882 XHJ-YQ-10
6	硫酸盐	离子色谱法 HJ/T84-2001	0.09 mg/L	离子色谱仪 Basic IC882 XHJ-YQ-10
7	硝酸盐(以 N 计)	离子色谱法 HJ/T 84-2001	0.08mg/L	离子色谱仪 Basic IC882 XHJ-YQ-10
8	pH	玻璃电极法 GB / T 5750.4-2006 中 5.1	--	pH 计 XHJ-SJ-16
9	氟化物	离子色谱法 HJ/T84-2001	0.02mg/L	离子色谱仪 Basic IC882 XHJ-YQ-10
10	总硬度	乙二胺四乙酸二钠滴定法 GB/T 5750.4-2006 中 7.1	1.0 mg/L	---
11	亚硝酸盐(以 N 计)	重氮化偶合分光光度法 GB / T 5750.5-2006 中 10.1	0.001mg/L	分光光度计 VIS-7220G XHJ-SJ-08
12	铬（六价）	二苯碳酰二肼分光光度法 GB/T 5750.6-2006 中 10.1	0.004mg/L	分光光度计 VIS-7220N XHJ-SJ-13
13	挥发酚	4-氨基安替比林萃取光度法 GB/T 5750.4-2006 中 9.1	0.002 mg/L	可见光分光光度计 XHJ-SJ-06
14	铅	无火焰原子吸收分光光度法 GB/T 5750.6-2006 中 11.1	0.0025mg/L	原子吸收分光光度计 XHJ-YQ-05
15	镉	无火焰原子吸收分光光度法 GB/T 5750.6-2006 中 9.1	0.0005 mg/L	原子吸收分光光度计 XHJ-YQ-05
16	砷	原子荧光光度法 GB/T 5750.6-2006 中 6.1	0.001mg/L	原子荧光光度计 AFS-830 XHJ-YQ-11
17	汞	原子荧光法 GB/T 5750.6-2006 中 8.1	0.0001mg/L	原子荧光光度计 AFS-830 XHJ-YQ-11
18	铜	无火焰原子吸收分光光度法 GB/T 5750.6-2006 中 4.1	0.005 mg/L	原子吸收分光光度计 XHJ-YQ-05
19	锌	原子吸收光度法 GB/T 5750.6-2006 中 5.1	0.05 mg/L	原子吸收分光光度计 XHJ-YQ-05
20	镍	《生活饮用水标准检验方法金属指标》 GB/T 5750.6-2006 中 15.1	0.005 mg/L	石墨炉原子吸收分光光度计 XHJ-YQ-08
21	氰化物	《水质 氰化物的测定 容量法和分光光度法》异盐酸-比唑啉酮分光光度法 HJ 484-2009	0.002 mg/L	可见分光光度计 XHJ-SJ-13
22	氨氮	纳氏试剂分光光度法 GB/T 5750.5-2006 中 9.1	0.02mg/L	分光光度计 VIS-7220N XHJ-SJ-14

环境空气分析方法及检出限				
序号	项目	分析方法	检出限	仪器名称、编号
1	SO_2	甲醛吸收副玫瑰苯胺分光光度法 HJ482-2009	小时浓度 0.007mg/m^3 日均浓度 0.004mg/m^3	分光光度计 VIS-7220N XHJ-DQ-52
2	NO_2	盐酸萘乙二胺分光光度法 HJ479-2009	小时浓度 0.005mg/m^3 日均浓度 0.003mg/m^3	分光光度计 VIS-7220N XHJ-DQ-52
3	PM_{10}	重量法 HJ618-2011	0.010mg/m^3	电子天平 XHJ-BG-04
4	H_2SO_4	离子色谱法 HJ544-2009	0.01 mg/m^3	离子色谱仪 Basic IC882 XHJYQ-01
5	苯并芘	高效液相色谱法 GB/T15349-1995	1.8×10^{-4} μ g/m^3	高效液相色谱仪 U3000 XHJ-YQ-06
6	铅	石墨炉原子吸收法 HJ539-2009	0.005 μ g/m^3	原子吸收仪 PEAA700 XHJ-YQ-08
7	TVOC	《空气和废气检测分析方法》 （第四版增补版）	—	气相色谱 GC9790 II TSZL-2013-01
8	苯	气相色谱法 HJ583-2010	0.002 mg/m^3	气相色谱仪 GC-2010 XHJ-YQ-9
9	酚	4-氨基安替比林分光光度法 HJ/T32-1999	0.01 mg/m^3	分光光度计 VIS-7220G XHJ-SJ-08
10	甲醇	《空气和废气监测分析方法》 （第四版增补版）	0.1mg/m^3	北分 SP3400 气相色谱仪 XHJ-YA-04
11	氨	纳氏试剂分光光度法 HJ533-2009	0.010mg/m^3	分光光度计 VIS-7220N XHJ-DQ-52
12	硫化氢	《空气和废气监测分析方法》 （第四版增补版）	0.001 mg/m^3	分光光度计 VIS-7220N XHJ-DQ-52
13	氯化氢	离子色谱法 HJ549-2009	0.003 mg/m^3	离子色谱仪 BASIC-IC882 XHJ-YQ-010

河北邢台县旭阳经济开发区总体规划
环境质量现状SO_2监测结果

单位：mg/m^3

日期	点位	SO_2				
		02:00	08:00	14:00	20:00	日均值
2014-3-25	1#北王段村	0.057	0.042	0.081	0.023	0.055
	2#长信村	0.074	0.042	0.011	0.121	0.068
	3#兰羊村	0.023	0.095	0.071	0.033	0.077
2014-3-26	1#北王段村	0.077	0.032	0.027	0.049	0.061
	2#长信村	0.102	0.093	0.051	0.034	0.063
	3#兰羊村	0.088	0.024	0.041	0.080	0.060
2014-3-27	1#北王段村	0.039	0.045	0.067	0.051	0.042
	2#长信村	0.025	0.070	0.037	0.035	0.050
	3#兰羊村	0.082	0.049	0.050	0.022	0.049
2014-3-28	1#北王段村	0.018	0.084	0.052	0.015	0.053
	2#长信村	0.040	0.031	0.026	0.049	0.033
	3#兰羊村	0.029	0.045	0.033	0.079	0.040
2014-3-29	1#北王段村	0.017	0.054	0.043	0.029	0.042
	2#长信村	0.050	0.017	0.044	0.025	0.038
	3#兰羊村	0.028	0.102	0.075	0.021	0.074
2014-3-30	1#北王段村	0.091	0.073	0.024	0.067	0.058
	2#长信村	0.037	0.049	0.028	0.046	0.030
	3#兰羊村	0.026	0.024	0.042	0.071	0.050
2014-3-31	1#北王段村	0.092	0.055	0.032	0.060	0.070
	2#长信村	0.107	0.044	0.013	0.050	0.055
	3#兰羊村	0.032	0.023	0.055	0.047	0.030

河北邢台县旭阳经济开发区总体规划
环境质量现状SO_2监测结果

单位：mg/m^3

日期	点位	SO_2				
		02:00	08:00	14:00	20:00	日均值
2014-3-25	4#邓村	0.053	0.037	0.014	0.019	0.042
	5#官庄	0.025	0.077	0.092	0.068	0.066
	6#孝子村	0.041	0.102	0.060	0.074	0.058
2014-3-26	4#邓村	0.039	0.075	0.027	0.038	0.050
	5#官庄	0.085	0.114	0.028	0.055	0.072
	6#孝子村	0.134	0.149	0.044	0.068	0.081
2014-3-27	4#邓村	0.040	0.042	0.056	0.024	0.048
	5#官庄	0.089	0.061	0.022	0.033	0.050
	6#孝子村	0.033	0.065	0.027	0.031	0.049
2014-3-28	4#邓村	0.035	0.013	0.032	0.067	0.042
	5#官庄	0.047	0.053	0.041	0.019	0.033
	6#孝子村	0.031	0.037	0.062	0.042	0.050
2014-3-29	4#邓村	0.023	0.070	0.049	0.027	0.040
	5#官庄	0.042	0.082	0.025	0.044	0.063
	6#孝子村	0.063	0.044	0.075	0.018	0.050
2014-3-30	4#邓村	0.031	0.057	0.022	0.040	0.039
	5#官庄	0.048	0.013	0.095	0.019	0.044
	6#孝子村	0.013	0.121	0.021	0.024	0.039
2014-3-31	4#邓村	0.035	0.083	0.030	0.018	0.041
	5#官庄	0.062	0.077	0.055	0.029	0.055
	6#孝子村	0.075	0.069	0.050	0.024	0.049

河北邢台县旭阳经济开发区总体规划
环境质量现状NO_2监测结果

单位：mg/m^3

日期	点位	NO_2				
		02:00	08:00	14:00	20:00	日均值
2014-3-25	1#北王段村	0.027	0.070	0.019	0.029	0.046
	2#长信村	0.042	0.078	0.023	0.031	0.069
	3#兰羊村	0.076	0.039	0.021	0.025	0.065
2014-3-26	1#北王段村	0.018	0.040	0.033	0.048	0.042
	2#长信村	0.030	0.045	0.105	0.071	0.072
	3#兰羊村	0.032	0.021	0.038	0.076	0.070
2014-3-27	1#北王段村	0.066	0.083	0.049	0.064	0.073
	2#长信村	0.058	0.044	0.063	0.096	0.074
	3#兰羊村	0.062	0.118	0.027	0.071	0.069
2014-3-28	1#北王段村	0.068	0.072	0.043	0.081	0.070
	2#长信村	0.086	0.106	0.023	0.078	0.072
	3#兰羊村	0.047	0.099	0.033	0.056	0.062
2014-3-29	1#北王段村	0.084	0.086	0.019	0.038	0.071
	2#长信村	0.039	0.067	0.049	0.096	0.066
	3#兰羊村	0.088	0.046	0.031	0.020	0.067
2014-3-30	1#北王段村	0.060	0.037	0.013	0.021	0.048
	2#长信村	0.097	0.061	0.032	0.023	0.051
	3#兰羊村	0.064	0.045	0.024	0.017	0.046
2014-3-31	1#北王段村	0.026	0.025	0.021	0.038	0.029
	2#长信村	0.013	0.025	0.007	0.043	0.036
	3#兰羊村	0.033	0.017	0.032	0.017	0.027

河北邢台县旭阳经济开发区总体规划
环境质量现状NO_2监测结果

单位：mg/m^3

日期	点位	NO_2				
		02:00	08:00	14:00	20:00	日均值
2014-3-25	4#邓村	0.079	0.097	0.039	0.058	0.043
	5#官庄	0.053	0.095	0.033	0.023	0.051
	6#孝子村	0.072	0.062	0.019	0.029	0.064
2014-3-26	4#邓村	0.045	0.110	0.098	0.048	0.067
	5#官庄	0.090	0.057	0.027	0.055	0.062
	6#孝子村	0.080	0.044	0.062	0.046	0.071
2014-3-27	4#邓村	0.110	0.096	0.098	0.049	0.075
	5#官庄	0.045	0.110	0.034	0.037	0.070
	6#孝子村	0.088	0.076	0.051	0.073	0.071
2014-3-28	4#邓村	0.116	0.096	0.053	0.050	0.074
	5#官庄	0.087	0.023	0.030	0.043	0.071
	6#孝子村	0.098	0.049	0.046	0.069	0.070
2014-3-29	4#邓村	0.074	0.076	0.036	0.023	0.066
	5#官庄	0.059	0.095	0.023	0.057	0.060
	6#孝子村	0.083	0.021	0.036	0.024	0.076
2014-3-30	4#邓村	0.110	0.054	0.033	0.037	0.041
	5#官庄	0.035	0.066	0.026	0.027	0.059
	6#孝子村	0.092	0.020	0.032	0.026	0.065
2014-3-31	4#邓村	0.040	0.067	0.032	0.029	0.038
	5#官庄	0.058	0.038	0.035	0.059	0.050
	6#孝子村	0.047	0.065	0.051	0.021	0.053

河北邢台县旭阳经济开发区总体规划
环境质量现状二甲苯监测结果

单位：mg/m^3

日期	点位	二甲苯			
		02:00	08:00	14:00	20:00
2014-3-25	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-26	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-27	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-28	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-29	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-30	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-31	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND

备注：ND表示未检出。

河北邢台县旭阳经济开发区总体规划
环境质量现状二甲苯监测结果

单位：mg/m^3

日期	点位	二甲苯			
		02:00	08:00	14:00	20:00
2014-3-25	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-26	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-27	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-28	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-29	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-30	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-31	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND

备注：ND表示未检出。

河北邢台县旭阳经济开发区总体规划
环境质量现状HCL监测结果

单位：mg/m^3

日期	点位	HCl			
		02:00	08:00	14:00	20:00
2014-3-25	1#北王段村	0.013	0.022	0.023	0.020
	2#长信村	0.015	0.019	0.023	0.021
	3#兰羊村	0.023	0.028	0.033	0.022
2014-3-26	1#北王段村	0.014	0.018	0.023	0.020
	2#长信村	0.015	0.016	0.038	0.025
	3#兰羊村	0.005	0.013	0.016	0.015
2014-3-27	1#北王段村	0.016	0.020	0.026	0.025
	2#长信村	0.013	0.021	0.035	0.028
	3#兰羊村	0.023	0.024	0.044	0.036
2014-3-28	1#北王段村	0.016	0.017	0.022	0.021
	2#长信村	0.015	0.018	0.022	0.016
	3#兰羊村	0.013	0.016	0.024	0.020
2014-3-29	1#北王段村	0.015	0.022	0.036	0.028
	2#长信村	0.015	0.023	0.029	0.025
	3#兰羊村	0.011	0.021	0.035	0.025
2014-3-30	1#北王段村	0.015	0.014	0.022	0.020
	2#长信村	0.015	0.021	0.029	0.026
	3#兰羊村	0.022	0.025	0.046	0.027
2014-3-31	1#北王段村	0.017	0.022	0.024	0.016
	2#长信村	0.013	0.021	0.034	0.020
	3#兰羊村	0.006	0.015	0.023	0.019

河北邢台县旭阳经济开发区总体规划
环境质量现状HCL监测结果

单位：mg/m^3

日期	点位	HCl			
		02:00	08:00	14:00	20:00
2014-3-25	4#邓村	0.018	0.021	0.028	0.024
	5#官庄	0.013	0.019	0.042	0.028
	6#孝子村	0.025	0.027	0.030	0.024
2014-3-26	4#邓村	0.023	0.024	0.035	0.032
	5#官庄	0.013	0.014	0.020	0.020
	6#孝子村	0.021	0.025	0.028	0.027
2014-3-27	4#邓村	0.016	0.020	0.026	0.025
	5#官庄	0.013	0.021	0.035	0.028
	6#孝子村	0.023	0.024	0.044	0.036
2014-3-28	4#邓村	0.020	0.019	0.028	0.027
	5#官庄	0.018	0.020	0.030	0.027
	6#孝子村	0.005	0.011	0.022	0.020
2014-3-29	4#邓村	0.017	0.022	0.024	0.023
	5#官庄	0.015	0.023	0.029	0.025
	6#孝子村	0.011	0.021	0.028	0.025
2014-3-30	4#邓村	0.015	0.014	0.022	0.020
	5#官庄	0.020	0.021	0.026	0.023
	6#孝子村	0.022	0.025	0.041	0.027
2014-3-31	4#邓村	0.020	0.022	0.024	0.023
	5#官庄	0.009	0.017	0.021	0.020
	6#孝子村	0.016	0.022	0.033	0.020

河北邢台县旭阳经济开发区总体规划环境质量现状B{a}P监测结果

单位：mg/m^3

日期 点位	2014-3-25	2014-3-26	2014-3-27	2014-3-28	2014-3-29	2014-3-30	2014-3-31
1#北王段村	ND	ND	ND	ND	ND	ND	ND
2#长信村	ND	ND	ND	ND	ND	ND	ND
3#兰羊村	ND	ND	ND	ND	ND	ND	ND
4#邓村	ND	ND	ND	ND	ND	ND	ND
5#官庄	ND	ND	ND	ND	ND	ND	ND
6#孝子村	ND	ND	ND	ND	ND	ND	ND

备注：ND表示未检出。

河北邢台县旭阳经济开发区总体规划环境质量现状Pb监测结果

单位：μg/m^3

日期 / 点位	2014-3-25	2014-3-26	2014-3-27	2014-3-28	2014-3-29	2014-3-30	2014-3-31
1#北王段村	0.157	0.212	0.253	0.126	0.176	0.258	0.194
2#长信村	0.155	0.390	0.234	0.102	0.108	0.169	0.338
3#兰羊村	0.085	0.221	0.227	0.091	0.153	0.167	0.235
4#邓村	0.182	0.229	0.169	0.131	0.139	0.123	0.185
5#官庄	0.063	0.272	0.096	0.107	0.152	0.089	0.293
6#孝子村	0.133	0.272	0.101	0.173	0.119	0.209	0.245

河北邢台县旭阳经济开发区总体规划环境质量现状TVOC监测结果

单位：mg/m^3

日期 / 点位	2014-3-25	2014-3-26	2014-3-27	2014-3-28	2014-3-29	2014-3-30	2014-3-31
1#北王段村	0.0143	0.0080	0.0066	0.0085	0.0105	0.0077	0.0078
2#长信村	0.0200	0.0108	0.0106	0.0141	0.0125	0.0139	0.0098
3#兰羊村	0.0244	0.0171	0.0151	0.0213	0.0079	0.0096	0.0172
4#邓村	0.0168	0.0170	0.0156	0.0079	0.0145	0.0158	0.0086
5#官庄	0.0138	0.0111	0.0218	0.0142	0.0122	0.0158	0.0161
6#孝子村	0.0124	0.0120	0.0115	0.0142	0.0136	0.0139	0.0157

河北邢台县旭阳经济开发区总体规划环境质量现状H_2SO4监测结果

单位：mg/m^3

日期 点位	2014-3-25	2014-3-26	2014-3-27	2014-3-28	2014-3-29	2014-3-30	2014-3-31
1#北王段村	0.04	0.06	0.06	0.04	0.04	0.04	0.03
2#长信村	0.04	0.06	0.06	0.05	0.04	0.05	0.03
3#兰羊村	0.04	0.06	0.09	0.02	0.04	0.06	0.03
4#邓村	0.04	0.06	0.06	0.05	0.03	0.04	0.04
5#官庄	0.04	0.05	0.06	0.05	0.04	0.04	0.03
6#孝子村	0.03	0.06	0.06	0.05	0.04	0.05	0.03

河北邢台县旭阳经济开发区总体规划环境质量现状PM_{10}监测结果

单位：mg/m^3

日期 点位	2014-3-25	2014-3-26	2014-3-27	2014-3-28	2014-3-29	2014-3-30	2014-3-31
1#北王段村	0.367	0.461	0.322	0.213	0.333	0.329	0.286
2#长信村	0.304	0.212	0.365	0.363	0.399	0.350	0.344
3#兰羊村	0.343	0.547	0.382	0.318	0.312	0.215	0.299
4#邓村	0.331	0.431	0.359	0.336	0.305	0.286	0.356
5#官庄	0.349	0.382	0.295	0.307	0.299	0.297	0.379
6#孝子村	0.329	0.352	0.281	0.327	0.335	0.325	0.280

河北邢台县旭阳经济开发区总体规划
环境质量现状甲醇监测结果

单位：mg/m^3

日期	点位	甲醇			
		02:00	08:00	14:00	20:00
2014-3-25	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-26	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-27	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-28	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-29	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-30	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-31	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND

备注：ND表示未检出。

河北邢台县旭阳经济开发区总体规划
环境质量现状甲醇监测结果

单位：mg/m^3

日期	点位	甲醇			
		02:00	08:00	14:00	20:00
2014-3-25	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-26	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-27	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-28	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-29	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-30	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-31	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND

备注：ND表示未检出。

河北邢台县旭阳经济开发区总体规划
环境质量现状NH_3监测结果

单位：mg/m^3

日期	点位	NH_3			
		02:00	08:00	14:00	20:00
2014-3-25	1#北王段村	0.079	0.124	0.091	0.053
	2#长信村	0.171	0.143	0.116	0.089
	3#兰羊村	0.174	0.146	0.108	0.167
2014-3-26	1#北王段村	0.057	0.033	0.175	0.109
	2#长信村	0.044	0.088	0.169	0.106
	3#兰羊村	0.131	0.061	0.040	0.123
2014-3-27	1#北王段村	0.133	0.151	0.088	0.150
	2#长信村	0.093	0.168	0.136	0.123
	3#兰羊村	0.090	0.031	0.195	0.159
2014-3-28	1#北王段村	0.093	0.187	0.124	0.062
	2#长信村	0.166	0.179	0.071	0.031
	3#兰羊村	0.128	0.137	0.062	0.189
2014-3-29	1#北王段村	0.143	0.074	0.059	0.150
	2#长信村	0.158	0.053	0.192	0.142
	3#兰羊村	0.044	0.105	0.074	0.153
2014-3-30	1#北王段村	0.082	0.031	0.091	0.150
	2#长信村	0.160	0.192	0.054	0.092
	3#兰羊村	0.136	0.187	0.054	0.081
2014-3-31	1#北王段村	0.025	0.055	0.155	0.048
	2#长信村	0.044	0.110	0.077	0.167
	3#兰羊村	0.090	0.025	0.051	0.123

河北邢台县旭阳经济开发区总体规划
环境质量现状NH_3监测结果

单位：mg/m^3

日期	点位	NH_3			
		02:00	08:00	14:00	20:00
2014-3-25	4#邓村	0.036	0.072	0.133	0.098
	5#官庄	0.082	0.137	0.068	0.120
	6#孝子村	0.087	0.099	0.046	0.064
2014-3-26	4#邓村	0.076	0.146	0.133	0.095
	5#官庄	0.114	0.168	0.051	0.084
	6#孝子村	0.085	0.050	0.043	0.100
2014-3-27	4#邓村	0.055	0.107	0.116	0.075
	5#官庄	0.114	0.170	0.065	0.145
	6#孝子村	0.117	0.077	0.093	0.107
2014-3-28	4#邓村	0.104	0.151	0.091	0.045
	5#官庄	0.117	0.090	0.108	0.048
	6#孝子村	0.090	0.107	0.051	0.117
2014-3-29	4#邓村	0.112	0.055	0.150	0.095
	5#官庄	0.047	0.118	0.167	0.087
	6#孝子村	0.098	0.069	0.057	0.128
2014-3-30	4#邓村	0.112	0.077	0.060	0.153
	5#官庄	0.049	0.091	0.141	0.106
	6#孝子村	0.055	0.083	0.062	0.109
2014-3-31	4#邓村	0.095	0.154	0.144	0.089
	5#官庄	0.104	0.069	0.051	0.023
	6#孝子村	0.090	0.058	0.113	0.150

河北邢台县旭阳经济开发区总体规划
环境质量现状H_2S监测结果

单位：mg/m^3

日期	点位	H_2S			
		02:00	08:00	14:00	20:00
2014-3-25	1#北王段村	0.005	0.006	0.008	0.003
	2#长信村	0.007	0.004	0.005	0.008
	3#兰羊村	0.005	0.009	0.006	0.005
2014-3-26	1#北王段村	0.004	0.005	0.005	0.003
	2#长信村	0.006	0.005	0.009	0.004
	3#兰羊村	0.004	0.009	0.007	0.005
2014-3-27	1#北王段村	0.005	0.009	0.002	0.004
	2#长信村	0.004	0.008	0.003	0.004
	3#兰羊村	0.008	0.009	0.006	0.002
2014-3-28	1#北王段村	0.004	0.003	0.004	0.006
	2#长信村	0.003	0.006	0.009	0.003
	3#兰羊村	0.005	0.003	0.005	0.007
2014-3-29	1#北王段村	0.004	0.006	0.009	0.004
	2#长信村	0.004	0.007	0.002	0.006
	3#兰羊村	0.003	0.006	0.002	0.006
2014-3-30	1#北王段村	0.008	0.007	0.006	0.005
	2#长信村	0.007	0.006	0.002	0.006
	3#兰羊村	0.005	0.004	0.006	0.002
2014-3-31	1#北王段村	0.007	0.004	0.005	0.006
	2#长信村	0.004	0.008	0.008	0.002
	3#兰羊村	0.006	0.007	0.007	0.005

河北邢台县旭阳经济开发区总体规划环
环境质量现状H_2S监测结果

单位：mg/m^3

日期	点位	H_2S			
		02:00	08:00	14:00	20:00
2014-3-25	4#邓村	0.003	0.008	0.004	0.002
	5#官庄	0.006	0.003	0.006	0.005
	6#孝子村	0.002	0.007	0.004	0.003
2014-3-26	4#邓村	0.004	0.007	0.004	0.002
	5#官庄	0.006	0.004	0.003	0.007
	6#孝子村	0.006	0.003	0.003	0.005
2014-3-27	4#邓村	0.007	0.006	0.004	0.008
	5#官庄	0.009	0.002	0.007	0.005
	6#孝子村	0.006	0.004	0.009	0.003
2014-3-28	4#邓村	0.009	0.002	0.005	0.004
	5#官庄	0.005	0.004	0.007	0.002
	6#孝子村	0.009	0.003	0.006	0.003
2014-3-29	4#邓村	0.003	0.008	0.002	0.006
	5#官庄	0.008	0.009	0.005	0.006
	6#孝子村	0.004	0.006	0.005	0.008
2014-3-30	4#邓村	0.004	0.007	0.002	0.006
	5#官庄	0.006	0.009	0.005	0.009
	6#孝子村	0.004	0.006	0.007	0.002
2014-3-31	4#邓村	0.005	0.009	0.005	0.006
	5#官庄	0.003	0.005	0.005	0.009
	6#孝子村	0.005	0.008	0.009	0.003

河北邢台县旭阳经济开发区总体规划
环境质量现状酚监测结果

单位：mg/m^3

日期	点位	酚			
		02:00	08:00	14:00	20:00
2014-3-25	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-26	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-27	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-28	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-29	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-30	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND
2014-3-31	1#北王段村	ND	ND	ND	ND
	2#长信村	ND	ND	ND	ND
	3#兰羊村	ND	ND	ND	ND

备注：ND表示未检出。

河北邢台县旭阳经济开发区总体规划
环境质量现状酚监测结果

单位：mg/m^3

日期	点位	酚			
		02:00	08:00	14:00	20:00
2014-3-25	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-26	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-27	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-28	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-29	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-30	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND
2014-3-31	4#邓村	ND	ND	ND	ND
	5#官庄	ND	ND	ND	ND
	6#孝子村	ND	ND	ND	ND

备注：ND表示未检出。

河北邢台县旭阳经济开发区总体规划
环境质量现状土壤监测结果

日期	监测项目	单位	点位名称	
			循环经济产业园上风向	循环经济产业园下风向
2014-3-24	PH	--	8.28	8.18
	阳离子交换量	cmol/kg	13.6	8.6
	铜	mg/kg	8.92	9.37
	铅	mg/kg	0.6	0.8
	锌	mg/kg	54.4	58.0
	铬	mg/kg	107	102
	砷	mg/kg	ND	ND
	镍	mg/kg	13.5	11.7
	镉	mg/kg	0.07	0.06
	汞	mg/kg	ND	ND

备注：ND表示未检出。

河北邢台县旭阳经济开发区总体规划
环境质量现状苯监测结果

单位：mg/m^3

日期	点位	苯				
		02:00	08:00	14:00	20:00	日均值
2014-3-25	1#北王段村	ND	ND	ND	0.003	0.0168
	2#长信村	ND	ND	ND	ND	0.0152
	3#兰羊村	0.008	0.015	ND	0.106	0.0080
2014-3-26	1#北王段村	ND	0.003	ND	0.007	0.0040
	2#长信村	0.002	ND	0.004	0.007	0.0080
	3#兰羊村	0.002	0.002	ND	ND	0.0060
2014-3-27	1#北王段村	ND	0.002	ND	0.005	0.0011
	2#长信村	ND	0.002	ND	0.003	0.0033
	3#兰羊村	0.007	0.005	0.003	ND	0.0019
2014-3-28	1#北王段村	ND	0.006	0.003	ND	0.0029
	2#长信村	0.003	0.002	0.009	ND	0.0079
	3#兰羊村	0.009	ND	0.003	0.011	0.0031
2014-3-29	1#北王段村	ND	0.004	ND	0.003	0.0002
	2#长信村	0.006	ND	0.007	ND	0.0086
	3#兰羊村	ND	0.009	0.008	ND	0.0042
2014-3-30	1#北王段村	ND	0.005	ND	0.003	0.0015
	2#长信村	0.004	ND	0.009	ND	0.0044
	3#兰羊村	ND	0.004	0.003	ND	0.0022
2014-3-31	1#北王段村	0.004	ND	0.002	ND	0.0029
	2#长信村	ND	0.012	ND	0.006	0.0060
	3#兰羊村	0.004	0.003	ND	ND	0.0019

备注：ND表示未检出。

河北邢台县旭阳经济开发区总体规划
环境质量现状苯监测结果

单位：mg/m^3

日期	点位	苯				
		02:00	08:00	14:00	20:00	日均值
2014-3-25	4#邓村	0.016	0.002	0.004	ND	0.0059
	5#官庄	ND	ND	0.006	ND	0.0035
	6#孝子村	0.002	ND	0.003	ND	0.0009
2014-3-26	4#邓村	0.003	0.022	ND	0.008	0.0020
	5#官庄	0.002	0.003	ND	0.005	0.0040
	6#孝子村	ND	0.002	0.005	ND	0.0010
2014-3-27	4#邓村	0.013	0.008	ND	0.005	0.0086
	5#官庄	0.003	ND	0.004	ND	0.0003
	6#孝子村	ND	0.002	ND	0.005	0.0003
2014-3-28	4#邓村	ND	0.009	ND	0.004	0.0070
	5#官庄	0.003	ND	0.005	ND	0.0002
	6#孝子村	ND	0.006	ND	0.004	0.0003
2014-3-29	4#邓村	0.005	ND	ND	0.003	0.0013
	5#官庄	0.003	ND	0.002	ND	0.0002
	6#孝子村	ND	ND	ND	ND	ND
2014-3-30	4#邓村	0.005	ND	ND	0.002	0.0002
	5#官庄	ND	0.003	ND	0.002	0.0004
	6#孝子村	0.004	ND	0.004	ND	0.0045
2014-3-31	4#邓村	ND	0.005	ND	0.007	0.0031
	5#官庄	0.003	ND	0.005	ND	0.0018
	6#孝子村	ND	0.007	ND	0.005	0.0030

备注：ND表示未检出。

河北邢台县旭阳经济开发区总体规划环境质量现状地下水监测结果

单位：mg/L(pH 除外)

点位 项目	东沙窝村		中煤旭阳焦化		北王段村		孝子村	
	深井	浅井	深井	浅井	深井	浅井	深井	浅井
pH	7.43	7.46	7.45	7.47	7.43	7.47	7.44	7.48
总硬度	244.2	392.4	250.3	344.3	255.3	360.4	258.3	352.3
高锰酸盐指数	0.80	1.03	0.83	1.04	0.84	1.06	0.86	1.04
溶解性总固体	410	536	396	510	408	540	390	524
氨氮	ND	ND	ND	ND	ND	ND	ND	ND
硝酸盐	3.26	4.31	3.11	4.45	3.34	4.72	2.98	3.74
亚硝酸盐	ND	ND	ND	ND	ND	ND	ND	ND
氟化物	0.21	0.33	0.24	0.28	0.26	0.42	0.31	0.44
氯化物	32.7	46.1	30.5	39.2	35.4	39.8	32.1	37.8
铜	ND	ND	ND	ND	ND	ND	ND	ND
锌	ND	ND	ND	ND	ND	ND	ND	ND
汞	ND	ND	ND	ND	ND	ND	ND	ND
砷	ND	ND	ND	ND	ND	ND	ND	ND
六价铬	ND	ND	ND	ND	ND	ND	ND	ND
铅	ND	ND	ND	ND	ND	ND	ND	ND
镉	ND	ND	ND	ND	ND	ND	ND	ND
硫酸盐	25.4	31.8	25.9	36.7	21.4	32.3	32.1	43.5
氰化物	ND	ND	ND	ND	ND	ND	ND	ND
挥发酚	ND	ND	ND	ND	ND	ND	ND	ND
镍	ND	ND	ND	ND	ND	ND	ND	ND
甲醇	ND	ND	ND	ND	ND	ND	ND	ND
苯	ND	ND	ND	ND	ND	ND	ND	ND
井深（米）	300	120	260	120	300	40	240	40
水位（米）	100	40	50	60	40	20	50	20

备注：ND 表示未检出。

河北邢台县旭阳经济开发区总体规划环境质量地下水监测结果

单位：mg/L(pH 除外)

点位 / 项目	西周村		邓村		张霍村	
	深井	浅井	深井	浅井	深井	浅井
pH	7.44	7.46	7.43	7.46	7.42	7.47
总硬度	270.3	372.4	262.3	394.4	266.3	330.3
高锰酸盐指数	0.88	1.04	0.78	1.00	0.80	1.10
溶解性总固体	442	528	412	540	420	496
氨氮	ND	ND	ND	ND	ND	ND
硝酸盐	2.45	3.76	3.46	4.23	3.75	4.68
亚硝酸盐	ND	ND	ND	ND	ND	ND
氟化物	0.23	0.44	0.27	0.49	0.32	0.49
氯化物	32.7	45.1	37.5	49.7	40.1	45.4
铜	ND	ND	ND	ND	ND	ND
锌	ND	ND	ND	ND	ND	ND
汞	ND	ND	ND	ND	ND	ND
砷	ND	ND	ND	ND	ND	ND
六价铬	ND	ND	ND	ND	ND	ND
铅	ND	ND	ND	ND	ND	ND
镉	ND	ND	ND	ND	ND	ND
硫酸盐	32.1	45.6	34.3	49.2	41.2	51.5
氰化物	ND	ND	ND	ND	ND	ND
挥发酚	ND	ND	ND	ND	ND	ND
镍	ND	ND	ND	ND	ND	ND
甲醇	ND	ND	ND	ND	ND	ND
苯	ND	ND	ND	ND	ND	ND
井深（米）	200	170	280	120	400	200
水位（米）	40	50	50	70	90	50

备注：ND 表示未检出。

河北邢台县旭阳经济开发区总体规划环境质量现状
噪声监测结果

测点代码	测点名称	监测时间			L_{10}	L_{50}	L_{90}	L_{ep}	L_{max}	L_{min}	标准差（SD）	备注
		月	日	时								
1	辛庄村北	3	26	17	45.1	42.3	40.0	43.4	62.0	36.2	2.4	
1		3	26	18	43.6	40.9	39.4	42.4	62.6	37.0	2.9	
1		3	26	19	46.8	43.7	41.5	44.6	60.6	38.7	2.9	
1		3	26	20	48.2	45.9	43.7	46.5	61.9	40.2	2.9	
1		3	26	21	48.3	45.3	42.9	46.5	68.5	39.2	2.8	
1		3	26	22	51.6	47.7	44.8	49.0	63.9	41.4	3.6	
1		3	26	23	51.9	48.0	44.7	50.0	66.4	40.2	3.2	
1		3	27	0	52.2	47.5	43.5	49.3	63.0	37.9	3.9	
1		3	27	1	52.1	47.7	44.3	49.5	69.3	38.2	3.9	
1		3	27	2	48.9	45.3	42.8	46.8	68.3	39.2	2.9	
1		3	27	3	51.1	47.7	45.2	49.8	66.5	42.1	3.3	
1		3	27	4	50.3	47.4	44.2	48.0	59.9	39.6	3.0	
1		3	27	5	58.6	50.6	49.2	57.6	72.8	47.0	5.0	
1		3	27	6	60.2	51.3	48.2	56.5	75.7	45.8	4.8	
1		3	27	7	58.8	46.4	42.4	57.2	76.4	39.6	6.7	
1		3	27	8	45.8	42.0	39.6	45.0	63.5	36.9	3.6	
1		3	27	9	47.4	40.5	37.7	47.0	68.5	34.9	4.7	
1		3	27	10	45.7	40.1	38.5	43.8	63.3	36.2	3.8	
1		3	27	11	42.6	38.6	36.9	42.3	63.4	34.9	3.1	
1		3	27	12	41.3	38.5	36.8	40.1	60.8	34.8	2.3	
1		3	27	13	47.2	43.0	40.4	44.8	64.8	37.2	3.4	
1		3	27	14	47.5	44.2	42.2	45.6	64.0	39.5	2.8	
1		3	27	15	52.0	48.2	45.1	49.7	69.1	41.8	3.3	
1		3	27	16	59.6	51.0	46.1	55.5	70.5	41.7	5.7	

Ld: 50.5 Ln: 51.5 Ldn: 57.4

河北邢台县旭阳经济开发区总体规划环境质量现状
噪声监测结果

测点代码	测点名称	监测时间			L_{10}	L_{50}	L_{90}	L_{ep}	L_{max}	L_{min}	标准差(SD)	备注
		月	日	时								
2	中煤旭阳焦化有限公司东厂界	3	26	18	58.3	57.1	56.1	57.3	67.1	54.4	1.0	
2		3	26	19	58.8	57.8	57.0	57.9	64.1	55.2	0.8	
2		3	26	20	58.8	58.1	57.3	58.1	61.9	55.4	0.6	
2		3	26	21	56.6	55.7	55.1	55.8	58.6	54.0	0.6	
2		3	26	22	58.2	57.5	56.8	57.5	67.1	55.6	0.6	
2		3	26	23	58.6	57.3	56.3	57.7	72.4	54.7	1.3	
2		3	27	0	57.3	56.5	55.8	56.6	66.6	54.3	0.8	
2		3	27	1	57.9	57.0	56.2	57.0	61.9	54.8	0.6	
2		3	27	2	57.5	56.8	56.0	56.7	59.3	54.4	0.6	
2		3	27	3	59.2	58.5	57.7	58.5	61.1	56.1	0.6	
2		3	27	4	60.1	58.4	56.9	58.6	63.1	55.3	1.3	
2		3	27	5	63.8	61.4	59.3	51.7	67.6	58.1	1.7	
2		3	27	6	59.8	59.0	58.3	59.0	68.8	57.0	0.6	
2		3	27	7	60.1	59.3	58.3	59.3	64.8	56.9	0.7	
2		3	27	8	57.9	56.8	55.7	56.9	63.4	54.0	0.9	
2		3	27	9	57.7	56.6	55.6	56.7	65.3	53.5	0.8	
2		3	27	10	57.3	55.9	54.9	56.1	63.0	53.5	0.9	
2		3	27	11	57.8	56.2	54.9	56.4	66.7	53.1	1.1	
2		3	27	12	56.8	55.6	54.2	55.6	62.8	52.2	1.0	
2		3	27	13	57.8	55.3	53.8	56.7	74.1	52.0	2.1	
2		3	27	14	62.5	57.0	54.7	59.6	74.7	52.4	3.2	
2		3	27	15	66.5	59.6	55.5	63.1	81.0	52.8	4.3	
2		3	27	16	65.6	58.9	56.4	62.7	84.8	54.2	3.8	
2		3	27	17	62.4	57.3	55.7	60.3	81.4	53.5	3.0	

Ld: 58.9 Ln: 58.4 Ldn: 64.5

河北邢台县旭阳经济开发区总体规划环境质量现状
噪声监测结果

测点代码	测点名称	监测时间			L_{10}	L_{50}	L_{90}	L_{ep}	L_{max}	L_{min}	标准差(SD)	备注
		月	日	时								
3	旭阳大道路中心外北30米处	3	26	18	65.7	57.1	48.5	62.5	88.4	43.5	6.9	
3		3	26	19	63.5	54.9	46.3	60.0	78.2	42.5	6.8	
3		3	26	20	64.0	54.0	45.0	59.9	75.8	41.1	7.4	
3		3	26	21	60.1	50.1	43.0	57.8	81.2	40.0	6.9	
3		3	26	22	62.6	53.6	44.8	58.9	73.6	40.8	6.8	
3		3	26	23	58.9	46.7	42.4	56.5	74.5	39.5	7.0	
3		3	27	0	61.3	48.4	43.4	58.3	75.4	40.0	7.2	
3		3	27	1	60.4	46.9	43.4	58.3	76.5	41.1	7.3	
3		3	27	2	58.9	45.3	41.8	57.5	77.5	38.5	7.3	
3		3	27	3	59.6	44.7	41.3	56.2	71.8	39.1	7.5	
3		3	27	4	61.1	44.4	40.8	57.1	74.5	39.0	7.8	
3		3	27	5	60.0	44.5	39.9	57.2	74.9	37.6	8.2	
3		3	27	6	61.2	52.0	45.6	57.1	74.8	41.6	6.2	
3		3	27	7	64.3	57.8	51.8	61.5	85.2	47.8	5.7	
3		3	27	8	65.9	55.5	44.8	61.3	77.3	40.9	7.8	
3		3	27	9	66.4	56.5	45.9	61.9	74.8	38.7	7.8	
3		3	27	10	66.3	55.2	45.6	61.9	85.8	40.5	7.7	
3		3	27	11	63.9	51.1	42.1	59.6	76.3	36.3	8.1	
3		3	27	12	62.7	50.1	41.7	58.3	83.7	35.8	7.7	
3		3	27	13	63.7	55.2	46.7	60.0	74.1	40.9	6.4	
3		3	27	14	66.8	58.3	48.9	62.8	82.5	42.1	6.6	
3		3	27	15	68.8	60.7	51.7	65.4	86.8	43.4	6.7	
3		3	27	16	69.1	60.8	53.0	65.8	84.3	47.0	6.6	
3		3	27	17	68.1	61.1	53.2	64.3	80.4	44.5	6.1	

Ld: 62.0 Ln: 57.6 Ldn: 64.7